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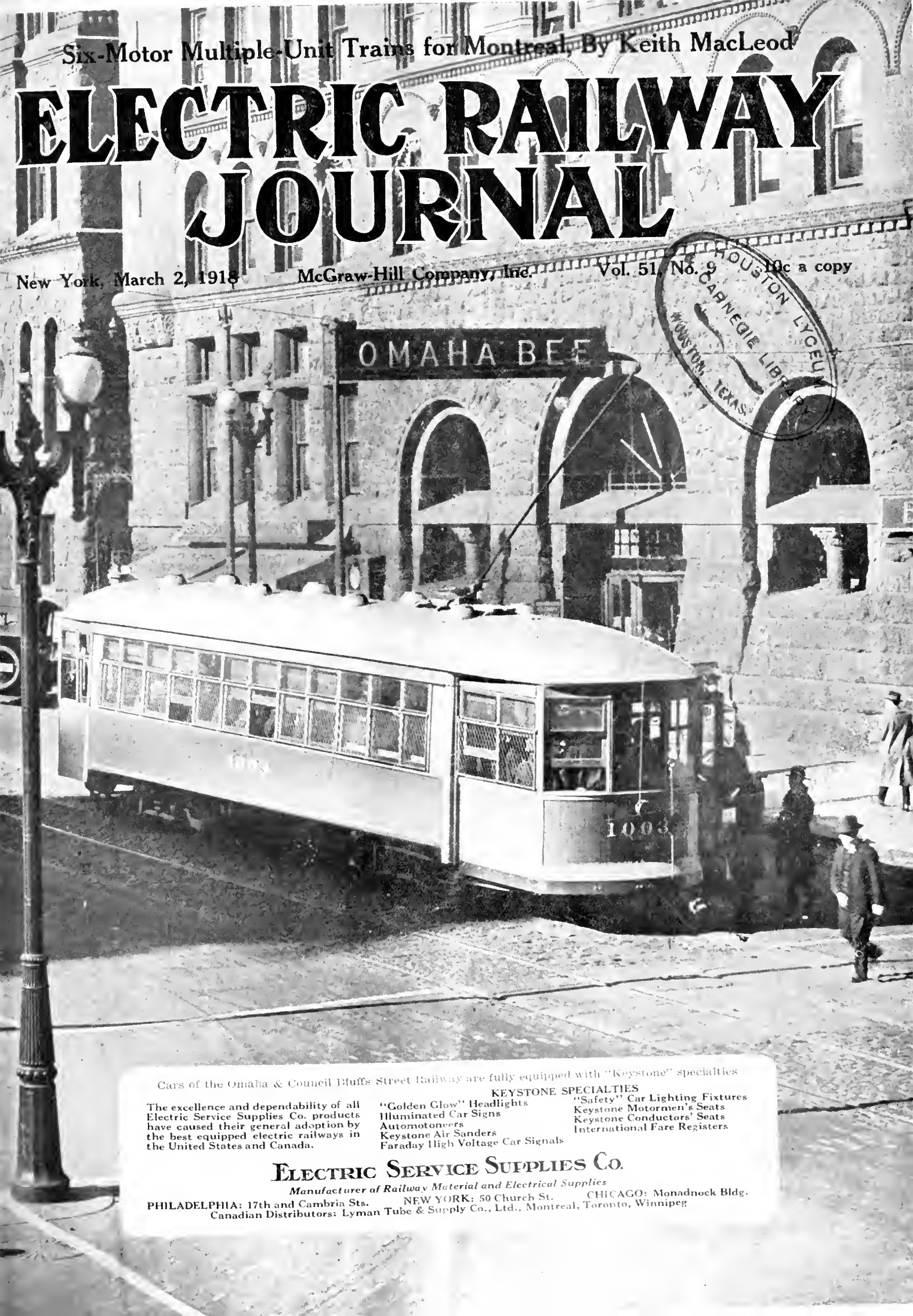
Six-Motor Multiple-Unit Trains for Montreal, By Keith MacLeod

# ELECTRIC RAILWAY JOURNAL

New York, March 2, 1918

McGraw-Hill Company, Inc.

Vol. 51, No. 9 10c a copy



Cars of the Omaha & Council Bluffs Street Railway are fully equipped with "Keystone" specialties

The excellence and dependability of all Electric Service Supplies Co. products have caused their general adoption by the best equipped electric railways in the United States and Canada.

"Golden Glow" Headlights  
Illuminated Car Signs  
Automotoneers  
Keystone Air Sanders  
Faraday High Voltage Car Signals

#### KEYSTONE SPECIALTIES

"Safety" Car Lighting Fixtures  
Keystone Motormen's Seats  
Keystone Conductors' Seats  
International Fare Registers

### ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA: 17th and Cambria Sts.

NEW YORK: 50 Church St.

CHICAGO: Monadnock Bldg.

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg



## Real Service

To Your Community Includes

### Electric Railway Freight Haulage

EVERY Electric Railway in the country owes it to their community to assume their full share of the burden of collecting and delivering freight and express and thus relieve the congestion on the steam railroads.

Establish this service now. It will surely be appreciated and without question will result in a permanent benefit to both the community and the electric railway company.

The Westinghouse Electric and The Baldwin Locomotive Company are ready to help you. We have standard Class A, B and C Electric Locomotives which will haul big loads with less current than most large interurban cars.

*Send for Circulars 1516-A and 1575*

Address either company

The Baldwin Locomotive Works  
Philadelphia, Pa.

Westinghouse Electric & Mfg. Co.  
East Pittsburgh, Pa.



# Electric Railway Journal

H. W. BLAKE, Editor

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### Six-Motor Multiple-Unit Trains for Montreal Tramways

Keith MacLeod tells of two-car semi-trail operation on grades up to 13 per cent; multiple-unit control with hand and automatic acceleration; semi-automatic brake system; emergency opening coupler and air-operated doors with safety interlocking control.....Page 403

### New Power Source for Columbus (Ohio) Railways

This station has large units for size of community served and is located without regard for load center. Most of the electrical equipment out of doors. No reciprocating units installed.....Page 407

### The Connecticut Company's Power Saving Campaign

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Give the Motorman Every Possible Chance. Utilities Must Be Maintained. Federal Commission to Investigate Labor Question. Public Improvements Should Be Deferred Wherever Possible. Keeping Track of Electric Railway Information. Fare Petitions Should Be Based on Facts, Not Feelings. Zone Fares Are Not a Primary Cause of Congestion. Planning for the Future More Important Than Ever Before.		LABOR CONDITIONS ON THE BROOKLYN RAPID TRANSIT .....	424
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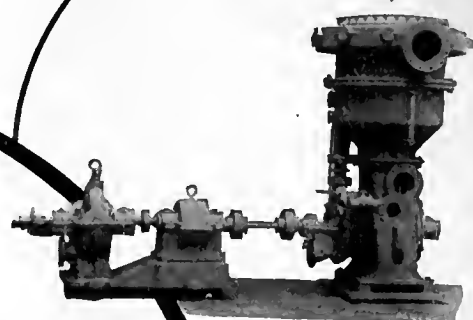
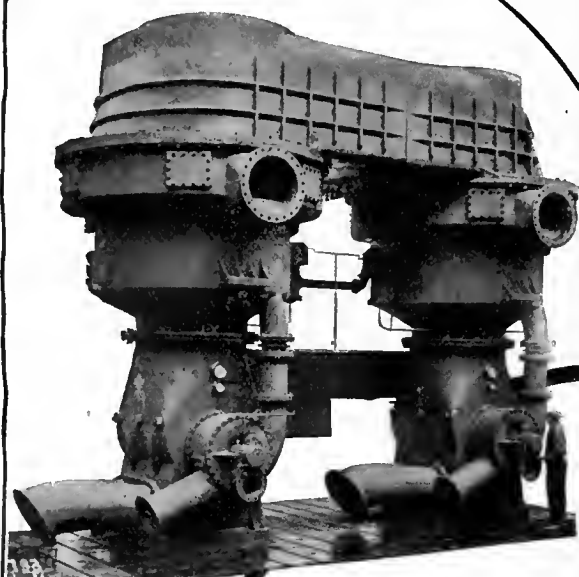
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Circulation of this issue 7300 copies

# Westinghouse Jet Condensers



## Simplicity and Compactness

Simplicity and Compactness are important features of all Westinghouse Leblanc Jet Condensers, from the small Ejector Type to the Twin Jet installations for the 40,000 kw. Turbine.

Westinghouse Electric & Manufacturing Co.  
East Pittsburgh, Pa.



The Westinghouse Leblanc Air Pump is the most effective Pump known for the production of high vacua. All Westinghouse Condensers, including both the Jet and the Surface Types, are equipped with this Pump.



# Type K-3 Lightning Arresters

## For Line, Car and Station Protection

### On Direct-Current Circuits up to 1500 Volts



Type K-3 Arrester without Spark Gap and Resistance

Equal in Protective Ability to any car-type electrolytic arrester, and without any of its inconveniences.

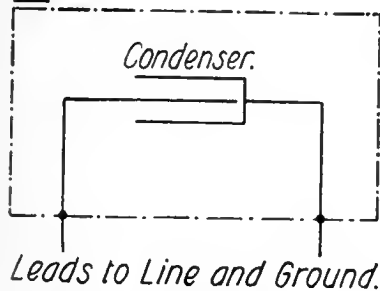
May be mounted on top or under the car. Once installed requires no attention, except occasional inspection.



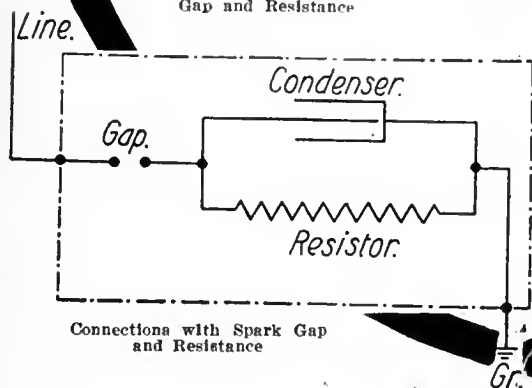
Type K Arrester with Spark Gap and Resistance, showing accessibility of Spark Gap Chamber

Type K Arresters make use of the condenser principle. A condenser will pass alternating-current with a freedom depending partly on the capacitance of the condenser, and partly on the frequency of the current. Static discharges induced by lightning are of frequencies ranging up to several million cycles, making the condenser principle an ideal one for the purpose. A high capacitance (1 M. F.) for the first time has been obtained within reasonable limits of cost, in the Type K-3 Arresters.

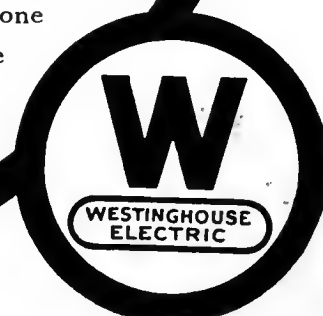
The highest available degree of protection is therefore obtained with none but an extremely small maintenance expense for infrequent inspections.



Connections without Spark Gap and Resistance



Connections with Spark Gap and Resistance



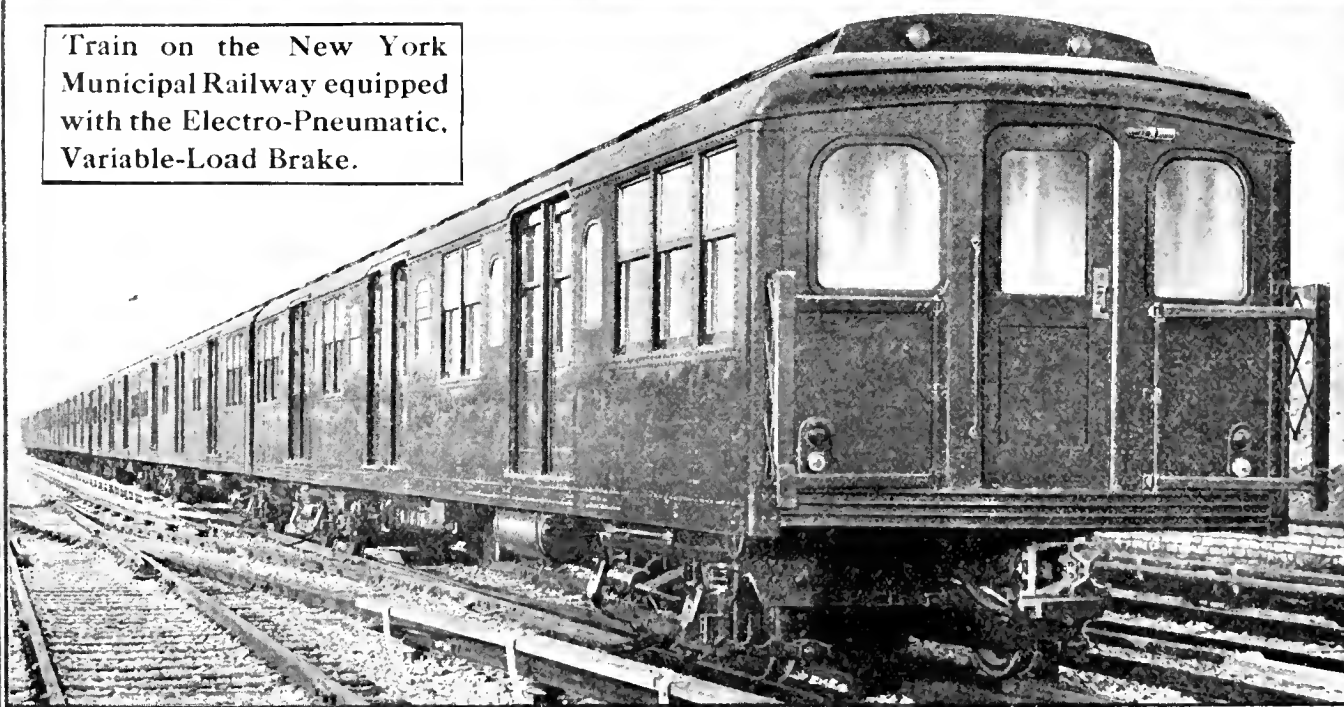
Send for Catalogue No. 1-A for a complete description of this arrester

**Westinghouse Electric & Manufacturing Company**  
East Pittsburgh, Pa.

# Westinghouse

# The Electro-Pneumatic Variable-Load Brake

Train on the New York Municipal Railway equipped with the Electro-Pneumatic Variable-Load Brake.



—automatically adjusts the braking power on the car to suit the load carried varying from minimum on an empty car to maximum when the car is fully loaded. The entrance of passengers to the car actuates the

adjusting mechanism and automatically increases the braking power. Similarly, the exit of passengers reduces the braking power. Hence a brake combining efficiency and safety in an unusual degree.

*Brake Building our Business for a Lifetime*

## Westinghouse Traction Brake Co.

General Offices and Works, Wilmerding, Pa.

Atlanta, Ga.  
Boston, Mass.  
Chicago, Ill.  
Columbus, O.

Denver, Col.  
Houston, Tex.  
Los Angeles



Mexico City  
New York, N. Y.  
Pittsburgh, Pa.

San Francisco  
Seattle, Wash.  
St. Louis, Mo.  
St. Paul, Minn.

## Tinkle, Tinkle, Little Car

Tinkle, tinkle, little car—if indeed that's what you are—running on the Summit line—how I wish that you were mine. I would put you in my flat as a playroom for our cat, so he couldn't catch our bird. You may think it sounds absurd; but when first the thing I spied, "Holy Smokes!" I wildly cried, "someone's child has strayed afar on his little kiddie kar."

When at length it came along, I decided I was wrong; thought it was the private bus of some plutocratic cuss, who prefers to ride alone with a street car all his own—or perhaps a circus van. Then it was the little man, seated on a stool in front, did a great magician stunt; pulled a throttle open wide, then a casement by his side folded up like some big fan. When this novel act began, down a tiny platform dropped and upon it people hopped, with their car fares in their hands. Then I saw a sight: My land!

Some had dollars, some had dimes. He makes change a dozen times, answers questions with a smile, hollers "Step up in the aisle"; pulls a lever here and there, regulating brakes and air. When he is prepared to go, shuts the bird-cage with his toe, moves a gadget with his knee—regulates the speed, you see—pulls the bell cord with his teeth, lest some folks get caught beneath. That would throw 'er off the track; maybe flop 'er on 'er back. Calls out names of every street, punches transfer with his feet. Thus he earns his daily pay, running cars out Summit Way. Worth a jitney, yea, and more, just to see him fold that door.—Seattle Post-Intelligencer.

# The POET

even  
saw the  
advantages  
of  
the

# Safety Devices

## on One-Man Cars

Poets are notoriously impractical. They walk with their heads up in the air—and stub their toes against the curb-stone.

But—the Safety Car, with its complete equipment of labor- and time-saving devices captured his roving poetical eye and held it!

The practical railroad man hardly needs poetry to impress him with the advantages of our devices—he knows!

If you don't—better ask us for our bulletins on the Safety Car.



## SAFETY CAR DEVICES CO.

Main Office—Boatmen's Bank Bldg., ST. LOUIS, MO.

CHICAGO  
Railway Exchange Bldg.

NEW YORK  
City Invest. Building

PITTSBURGH  
Westinghouse Building





# PRODUCTS



O-B Type F-3 Bond (Patented) Installed

## O-B Bonding Earns a Profit

Rail Bonds will pay for themselves and then earn a profit—provided they are good bonds.

First, they must make a low-resistance contact.

Next, they must retain that efficient contact.

Finally, they must stand up under vibration.

O-B Stud Terminal Bonds fulfill these requirements. Their terminals are made of pure copper accurately machined. Under pressure they flow tightly against the rail. Strands are properly formed to withstand vibration. There is a homogeneous weld between strand and terminals.

*There are many types of O-B Bonds. Tell us your conditions and we will help you decide which type is the right one for you.*

**The Ohio Brass Company, Mansfield, Ohio**

New York Philadelphia Pittsburgh Chicago Los Angeles San Francisco





# Imperial Incandescent Headlights

## Efficient—Reliable



Type S D P  
For Interurban Service



Type W D S  
For City and Suburban Service

### On Fluctuating Voltage

*Imperial Luminous Arcs project a powerful light on voltage which is low enough to reduce materially the efficiency of an incandescent lamp.*

All of the lamp's light is concentrated in a clear, sharp, effective beam, when an Imperial Incandescent Headlight is "Lighting the Way with Crystal Ray."

Crystal Ray reflectors are clear glass mirrors, paraboloids in shape, accurately ground and polished on both sides. They retain their efficiency under all conditions.

Mirror reflectors for Gold Ray (yellow light) or metal reflectors for Sterling Ray may be furnished. The choice depends on individual requirements.

Imperial Headlights are sturdy and substantial.

There are several types of Crouse Hinds Imperial Incandescent, Luminous Arc and Carbon Arc Headlights. A demonstration of any of them on your own cars can be arranged.

## The Ohio Brass Company, Mansfield, Ohio

New York Philadelphia Pittsburgh Chicago Los Angeles San Francisco

General Sales Agents in U. S. for Crouse-Hinds Imperial Headlights



Capital Street

Charleston, W. Va.

Kanawha Street

## West Virginia's Capital Has 60 Elreco Combination Poles

with 4 amp. G.E. ornamental luminous arc lamps, carried on our Fig. 10154 Brackets, on Capital and Kanawha Streets. Note that, if separate lamp standards had been used, the curb line would have been subject to considerable obstruction. Note, also, that the cost of separate lamp standards, and of the necessary underground construction, has been saved.



### Elreco Poles Can Never "Telescope"

because the "Wire Lock" Swedge Joint absolutely prevents slipping, while retaining the full strength of the walls. The Chamfered Joint is an effective bar to the entrance of water—the joint can never rust.

Catalogs describing the full line of Elreco Specialties are yours upon request—write!

## Electric Railway Equipment Co.

Cincinnati, Ohio

New York: 30 Church St.

# Concreting 1320 Ft. of Track Daily

## INTERNATIONAL STEEL TWIN TIES

### Make That Schedule Easy

200 cubic yards of concrete is being mixed and placed in 10 hours by a gang of twenty-five men on a number of street railway properties. With 800 cubic yards of concrete to the mile of steel twin tie track below the rail base, this gang will concrete completely 1320 ft. of track in 10 hours.

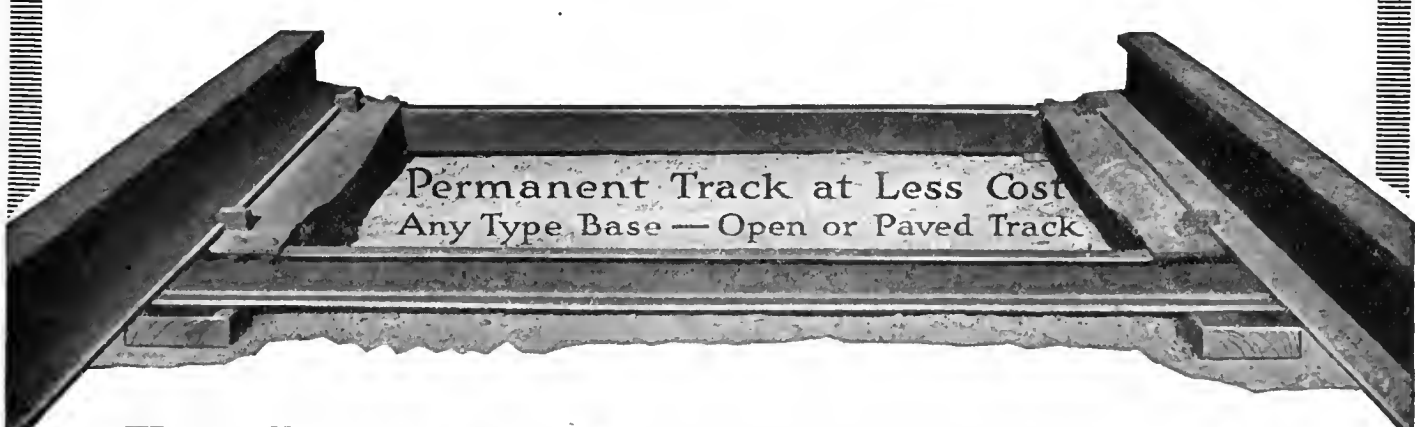
Steel twin ties in a seven-foot trench and with seven inches of concrete in bearing below the tie plate require less than 800 cubic yards per mile of track. That's why you can speed up the job to 132 ft. of track per working hour. Less Equipment and fewer men would not move so fast, but the ratio of progress would remain the same.

In addition, the excavation is reduced 50% and the number of ties to handle 66%. These also mean labor saving. And your track is out of service for a shorter period.

Ask the users of steel twin ties if you want to check these facts.

A stock of low-priced steel in hand insures a "rock bottom" price and prompt delivery. Order now and you'll be a regular user next year.

*Prompt deliveries made from stock*



Permanent Track at Less Cost  
Any Type Base — Open or Paved Track

## The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

#### REPRESENTATIVES:

Western Eng'g Sales Co.,  
Los Angeles, Cal.

San Francisco, Cal.  
Seattle, Wash.

R. J. Cooper Co.,  
Salt Lake City, Utah.

J. E. Lewis & Co.,  
Dallas, Texas.

Maurice Joy,  
Philadelphia.

William H. Ziegler  
Minneapolis, Minn.



# Traffic Direction Block System

## Scranton & Binghamton Railroad

This system is especially designed for the operation of interurban railroads. It combines the maximum of safety and efficiency with the least amount of apparatus.

### Union Switch & Signal Co.

SWISSVALE, PA.



Hudson Terminal Bldg.  
NEW YORK

Canadian Express Bldg.  
MONTREAL

Candler Annex  
ATLANTA

Peoples Gas Bldg.  
CHICAGO

Railway Exchange Bldg. So. Pacific Bldg.  
ST. LOUIS MO. SAN FRANCISCO

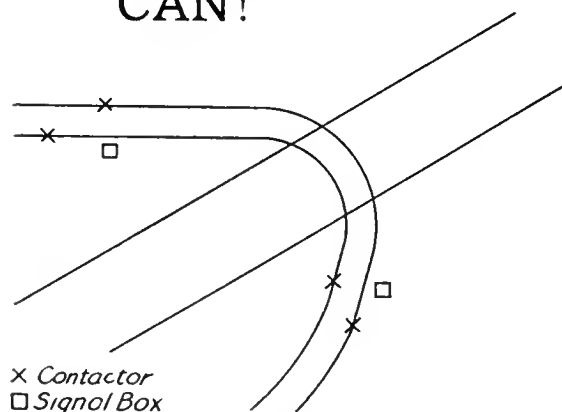


Represented by the GENERAL ELECTRIC CO. in Australasia, South Africa and Argentina.



## The motormen can't look around this double track curve

—but U. S.  
Electric Signals  
CAN!



At a certain hillside on the Public Service Railway a sharp double-track curve passes under a railroad bridge.

Of course, the opposing motormen can't see one another through the bridge, and as cars are unable to clear each other at the turn, danger would result were it not for U. S. Electric Signals.

These signals are so placed that the first car which reaches a cut-in contactor gets the right-of-way against the opposing car—

Thereby making side-swiping accidents practically impossible—also providing rear end protection—two important uses in one set of equipment.

**United States Electric Signal Company**  
West Newton, Massachusetts

Representatives:

Western: Frank F. Bodler, Monadnock Bldg., San Francisco

Chicago: Warren Moore Osborn, McCormick Bldg.

Foreign: Forest City Electric Service Supply Company, Salford, Eng.



# Penetration and Permanence

are the two qualities most necessary in a good preservative oil.

**PENETRATION**—because, in order to be effective, the oil must permeate the wood structure thoroughly.

**PERMANENCE**—because, if any considerable portion of the preservative oil evaporates, the wood becomes exposed and will rapidly decay and disintegrate.

A product that combines Permanence and power of Penetration in an unusual degree is



Reilly's Improved Permanent Creosote Oil is free from the volatile oils and adulterants.

It contains more than three times as many permanent properties as the next best oil. It cannot leave the wood under the most severe climatic conditions.

For paving and for ties, this oil is without an equal.

## Republic Creosoting Company

INDIANAPOLIS, INDIANA

Plants: Indianapolis

Minneapolis

Seattle

Mobile





# Phono-Electric

Twice the Wear, But Not Twice the Price

That is the simple arithmetic of Phono-Electric superiority.

When copper was 14 cents a pound the proportionate extra cost of Phono-Electric was a good bit more than it is today.

Yet many electric railways bought it and continue to buy it.

With copper now at a higher figure, the wire-life insurance charge for Phono-Electric is a better bargain than ever.

When you buy Phono-Electric you cut your worries about wire price fluctuations in half at least.

**Bridgeport Brass Company**  
**Bridgeport** **Connecticut**



Reason 4

for

# "COPPERWELD" TROLLEY WIRE

"Copperweld" trolley wire has no tendency to break even after 20 to 30 per cent wear of cross-section, since the enormous tensile strength of the steel core is practically unaffected.

It is well known that a copper trolley wire is unsafe after it has been worn to any such percentages as those stated.

The direct reason is not the degree of wear but the inability of copper to stand hammering and pounding.

Crystallized copper, no matter how little worn, is always subject to breakage.

"Copperweld" trolley wire, because of its steel core, will wear **safely** to a much greater degree than is possible with copper.

General Sales Office  
Page Steel and Wire Co.  
30 Church St., New York



Western Sales Office  
Steel Sales Corporation  
Chicago, Illinois

Made from the product of the Copper Clad Steel Co., Pittsburgh, Pa.

Drawn and sold exclusively by

# PAGE STEEL AND WIRE COMPANY

MONESSEN, PA.

ESTABLISHED 1883

# Wherever Good Tracks Are Maintained Reciprocating Track Grinders Are at Home



**MANILA ELECTRIC RAILROAD AND LIGHT COMPANY**

THE J. S. WHITE MANAGEMENT CORPORATION  
OPERATING MANAGERS

MANILA OFFICE  
159 SAN MARCELINO  
CABLE ADDRESS "MERALCO"

NEW YORK OFFICE  
42 EXCHANGE PLACE  
CABLE ADDRESS "MERALCO"

MANILA, P. I. December 13, 1917.

Railway Track-Work Company,  
30th and Walnut Streets,  
Philadelphia, Pa.

Dear Sirs:      Attention of Mr. Wm. B. Goodall.

**RECIPROCATING TRACK GRINDERS**

The Company begs to acknowledge receipt of your letter of October 29, 1917, with reference to reciprocating track grinders purchased from you.

The Company is pleased to advise that this grinder has been in operation ever since same was received and has proven entirely satisfactory in every respect.

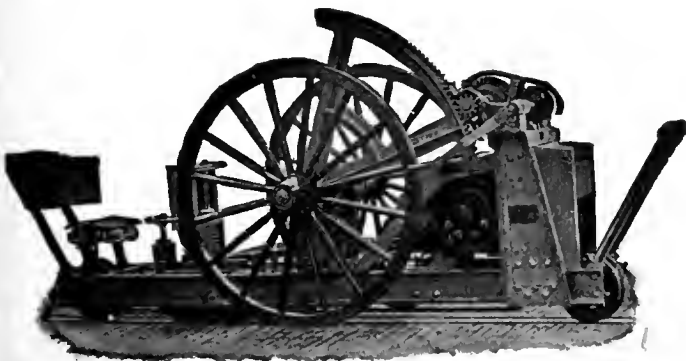
This grinder accomplishes the purpose for which it was intended, quickly and satisfactorily, and when occasion requires, the Company will be very glad to duplicate its order.

Very respectfully,

CEH:JGH

*[Signature]*  
Acting Manager, Railway Department.

This expression of complete satisfaction from the "land of our little brown brothers" with regard to the efficiency of *Reciprocating Track Grinders* is typical of the judgment expressed by more than 75 electric railway companies who know the value of this machine through actual experience with it. Under our sales plan you can demonstrate on your own tracks the value to you of the Reciprocating Grinder *before* you obligate yourself to buy.



## RAILWAY TRACK-WORK COMPANY

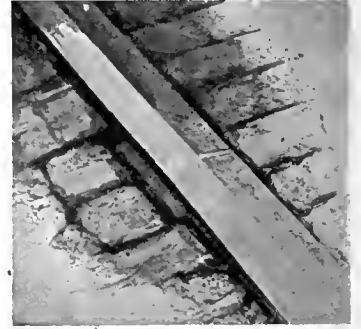
30th and Walnut Streets  
PHILADELPHIA, U. S. A.

Agents

Holden & White, Inc., 343 S. Dearborn St., Chicago.  
Wigmore, Hall & Co., Pacific Electric Bldg., Los Angeles, Cal.



1913



1918

## Life of Track Prolonged 5 Years—And Still Good No Maintenance—No Loss of Current No Pounding of Joints

Dec. 28, 1917.

The Indianapolis Switch & Frog Co.,  
Springfield, Ohio.

Gentlemen:—

We have been using two Indianapolis Portable Electric Welders on our property for the past four years and at the present time are contemplating the purchase of several more of these machines.

These machines have been the means of our saving many thousand dollars in the reclamation of worn out and broken parts such as track special work of all kinds, cupped rails, joint plates, etc., etc., and find them especially valuable at the present time in view of the excessive cost and slow delivery of material. We feel that we could not be without the use of these machines and would like to recommend them to others who are combating high cost of materials against the 5c carfare. We feel that these machines paid for themselves in sixty (60) days time, and have kept record of savings and would gladly submit this data to anyone who would feel that same would be of interest to them.

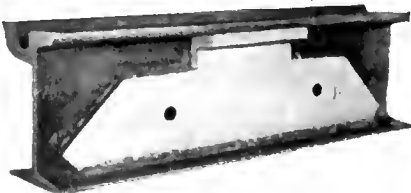
Yours very truly,

## INDIANAPOLIS WELDED JOINTS

Solution of the Joint and Bonding Problem  
Is Elimination of Joint Maintenance and  
Current Loss

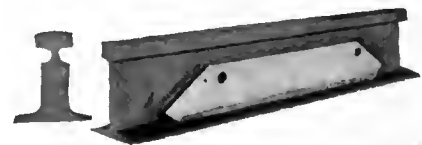
“APEX” Joint Supporting Head for  
Guard and Girder Rail

Test made  
by Robert  
W. Hunt  
& Co.,  
Chicago,  
Illinois



Deflection test of this joint showed under maximum wheel load (entirely suspended) deflection .018 in. Permanent set .000 in.

“SIMPLEX” Joint for High Tee Rail



Test of Bureau of Standards, Washington, D. C.

Conductivity of this joint showed 138 against 100 on unbroken rail.

Indianapolis Switch & Frog Company, Springfield, Ohio

# Now or Never

---

A call to action  
on the part of all  
who want electric  
railway business  
now or later

---

NOW the minds of electric railway men are on the  
subject of maintenance.

NOW every electric railway man will welcome any-  
thing that saves fuel and labor.

NOW every mechanical aid to efficiency and  
economy will find a ready welcome.

NOW the entire field is ready to scan eagerly the

Electric Railway Journal

## Annual Maintenance Number

[Fuel and Labor Saving Issue]

—combined with the *Monthly*—

*—combined with the Monthly*

## Mechanical Edition

# March 16, 1918

An unusual opportunity to tell how the products you offer will help in construction, maintenance or operation.

---

**T**HE Maintenance Number has always been used by Electric Railway Journal advertisers to carry an extra strong, complete selling story because it appears at the season when purchases for spring maintenance work are under discussion.

This year, being a fuel and labor saving issue, it will also be an unusually effective medium for producers of power plant and substation equipment.

Being also the monthly Mechanical Edition, it is a particularly effective medium in which to advertise shop equipment, tools and machinery in which the engineer and mechanical departments are interested.

---

## 1500 Extra Circulation 8800 Total Circulation

*No advance in rates for the added value*

---

Copy and Cuts Must be in by March 8

The best positions go to those who reserve them soonest. Better wire your reservation at once. A two-page spread or a full page, at least, will be an investment that will pay you well. Wire at our expense—NOW.

## Electric Railway Journal

Tenth Avenue at 36th Street

New York

Member Audit Bureau of Circulations





## MEN OF ACTION

invariably look ahead, then they go ahead, "hammer and tongs," and achieve their present purpose with maximum results.

Just so with "Thermit" welds, which are the acknowledged "maximum result" welds in use today.

Rail that has once been "Thermit" welded is solid, and continuous, for all the time afterward.

No more unnecessary paving expenses or rail joint inspection and maintenance, electrolytic waste checked for good.

The men of action who weld for permanence have looked ahead and realized the hundredfold return in rail economy obtained for the slight extra outlay of the "Thermit" outfit.



### METAL & THERMIT CORPORATION

Successors to Goldschmidt Detinning Co. and the Goldschmidt Thermit Co.  
120 BROADWAY, NEW YORK

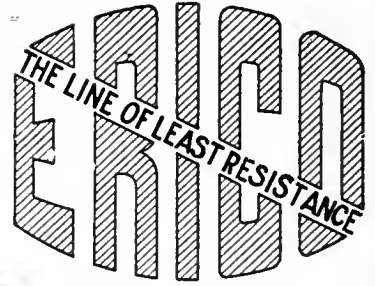
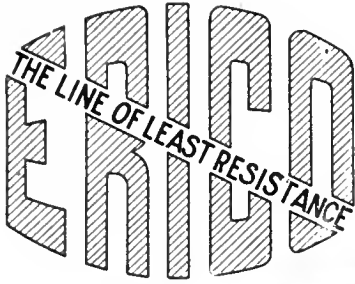
329-333 Folsom St., San Francisco  
7300 So. Chicago Ave., Chicago

103 Richmond St., W., Toronto, Ont.  
1427-1429 Western Ave., Pittsburgh, Pa.

Factories located at Chrome, N. Y.; Wyandotte, Mich.; East Chicago, Ind.; Jersey City, N. J.



Thermit Insert Rail Weld Completed



## At the End of the Line

The low voltage sometimes encountered at the end of the line or at points distant from the power station does not hinder the work of the

# ERICO Portable Welder

There are three "cut out" switches at the bottom of the rheostat that enable it to work on voltages anywhere from 250 to 750.

The nine "cut in" switches at the end of the rheostat give a current regulation of from 60

to 200 amperes.

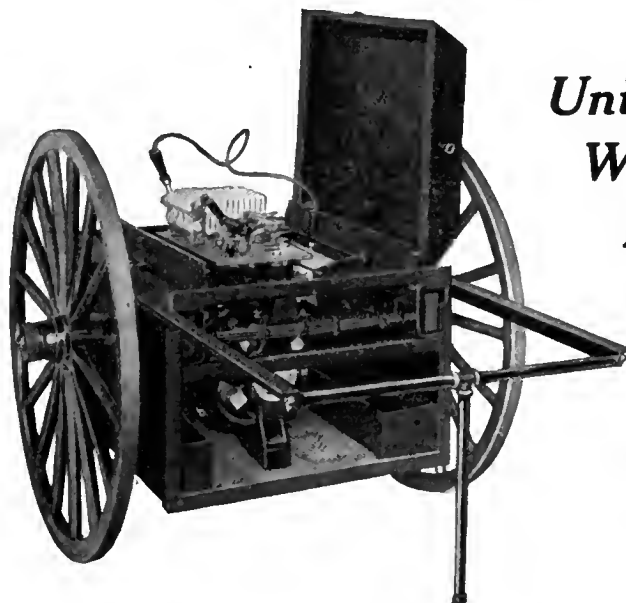
These points make it possible for the operator to have absolute control of the heating of the furnace. Let us give you further details.



**The Electric Railway Improvement Co.**  
Cleveland

# Do You Know of the ECONOMY in Arc Welding

being  
obtained  
with



Universal  
Welding  
Equipments

?

?

**Joint Welding** Joints are being installed with less than 7 K.W. per joint at a rate of  $2\frac{1}{2}$  joints per hour under 3 minute traffic headway with 3 men.

**Cupped Rails** are being welded with less than  $\frac{1}{10}$  the current consumed by resistance welders and the work done just as rapidly.

**Copper Bonds** can be welded with  $\frac{1}{4}$  K.W. per bond in 45 seconds. One hundred bonds can be installed per day.

**Shop Repairs** All kinds of shop repairs can be made, including carbon arc work needing heavy current in minimum time and less current than any other type of machine.

These economies can be had with the one outfit and are made possible by the convenience of transportation, adaptability to the various kinds of work demanded and the high electrical efficiency of the dynamotors.

*Write us or our nearest agent and let us tell you  
more about these equipments*



Trade Mark

## ATLANTIC WELDING COMPANY

30 CHURCH STREET NEW YORK



Trade Mark

### AGENTS

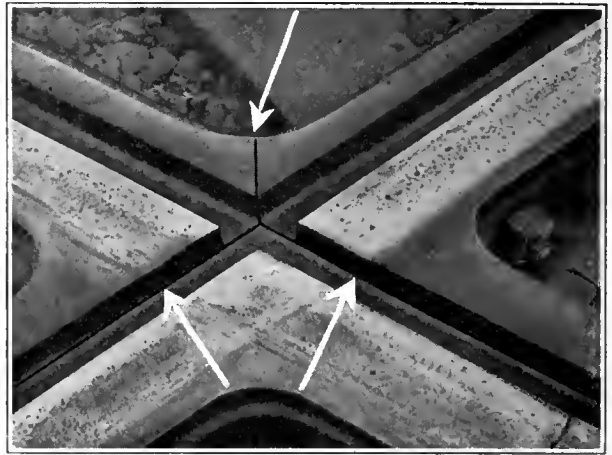
CHAS. N. WOOD CO.  
14 Federal Street, Boston, Mass.  
RAILWAY TRACK-WORK CO.  
30th & Walnut Sts., Phila., Pa.

THE ELEC. ENGINEERING & MFG. CO.  
First Nat. Bank Bldg., Pittsburg, Pa.  
HOLDEN & WHITE, Inc.  
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Montreal, Can.



What Happens to a Rolled Rail Crossing



Joints in Balkwill Articulated Cast Manganese Crossings are life savers. They positively prevent breakage at flangeway intersections, permitting 100% wear

## Why Balkwill Articulated Cast Manganese Crossings Are Superior to Rolled Rail Crossings

This picture at the left shows where breaks in the main steel filling or backbone of rolled rail crossings are usually found.

These breaks are unavoidable because of the lack of flexibility of the rolled steel filler at the flangeway intersection.

In the Balkwill Articulated Cast-Manganese Crossing the difficulty is

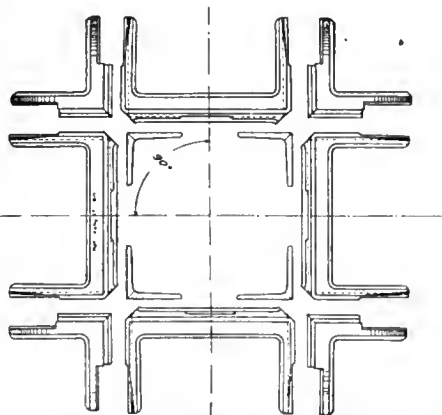
corrected by placing scientifically designed joints at the very places where breakage formerly occurred.

The lower first cost of a rolled rail crossing is therefore not a lower overall cost because it takes several rolled rail crossings to equal the life of one Balkwill Articulated Cast Manganese Crossing. Therefore the Balkwill Crossing is the cheapest in the long run. It gives

### MORE WEAR PER DOLLAR THAN ANY OTHER CROSSING YOU CAN BUY

It saves interruptions to traffic, makes less demand on labor, which is now so scarce, and also reduces the cost of making replacements frequently.

Write us for data on existing installations. If your special work manufacturer cannot get prompt deliveries of manganese castings or has not taken out a license to manufacture these crossings, **DON'T ACCEPT A SUBSTITUTE** but write us direct and we will see that your requirements are taken care of.



Joints at the flangeway intersections of Balkwill Articulated Cast Manganese Crossings positively eliminate breakage

**Order Balkwill Articulated Cast Manganese Crossings  
Direct from Your Special Work Manufacturers**

# **The Balkwill Manganese Crossing Co.**

506 Williamson Building, Cleveland, Ohio

# Safeguarding America's Great Railroads



An "Armco" Iron Corrugated Culvert under a heavy fill on the Western Pacific

## "ARMCO" IRON CULVERTS

All progressive railroad engineers figure culvert costs on the basis of annual service, taking into consideration replacements, washouts, etc. It is significant, therefore, how many of the big roads have largely employed "Armco" Rust Resisting Iron. "Armco" Iron Culverts cost less per year than any other type of construction.



**Resists Rust**

*Write or phone the nearest manufacturer for particulars and prices on "Armco" Iron Culverts, Signs, Sheets, Roofing and Formed Products.*



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**Arkansas, Little Rock**  
Dixie Culvert & Metal Co.  
**California, Los Angeles**  
California Cor. Culvert Co.  
**California, West Berkeley**  
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**Colorado, Denver**  
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Delaware Metal Culvert Co.  
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Dixie Culvert & Metal Co.  
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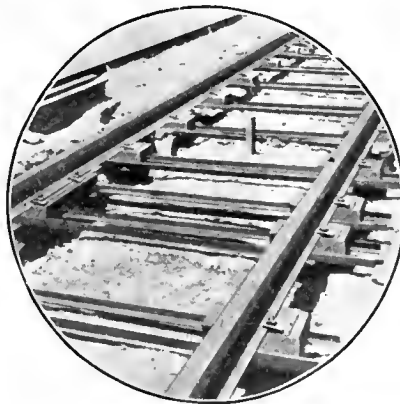
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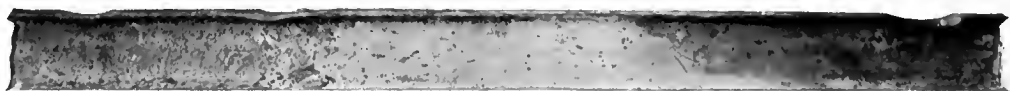
The asphalt cushion in D-M Ties  
saves your rails, your track and  
your rolling stock

A 6" Steel I-Beam used  
as a Tie showed  
Indentations like  
**THIS!**



What must have been  
the effect on the roll-  
ing stock to produce a  
dent like  
**THIS?**

In the above small circular picture is shown  
a stretch of new track with D.M. Ties,  
ready for the concrete to be poured in to  
make a unit structure.



When a steel I-Beam fully 6 in. deep can  
be hammered and distorted as shown in this  
picture, enormously powerful blows must  
have rained upon it. It was the absence of  
a resilient cushion that made this tie suffer.  
Such destruction could not have occurred to  
D.M. Ties, which have wooden blocks, set  
in asphalt, joined by steel twin bars.

*Rigid—Resilient—Permanent.*

*Ask for details*

**THE DAYTON MECHANICAL TIE CO.**

201 Third Street Arcade  
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*I am—  
"The Watchdog of Your Power!"*



**ECONOMY ELECTRIC RAILWAY METER**  
SANGAMO ELECTRIC COMPANY  
SPRINGFIELD, ILLINOIS.  
NO. 720538 VOLTS 550 AMPS. 200  
66 2/3 WATTHOURS PER DISK REVOLUTION  
MFD. EXCLUSIVELY FOR  
**ECONOMY ELECTRIC DEVICES CO.**  
CHICAGO

My duty is to guide and to guard.  
To lay bare waste; to foster economy.  
To show the motorman the most efficient way of drawing on that costly supply of electrical energy subject to his slightest touch.  
To point out to him, through friendly instruction, the substantial savings in energy which he can effect by the correct use of controller and brake.  
I work for the management that installs me.  
I work for the motorman on whose car I operate.  
I play fair with both.  
I produce results in the simplest, most direct way.  
I meter the energy because that's what you want to save.  
I am always on the job.  
I ask no favors—I pay my way.  
I'll save you 10 to 15 per cent. in power.

*I am—  
the  
ECONOMY Meter*





## “D & W” Products Make Ideal Maintenance Easy

DELTATAPE permits the winding of a much better ribbon wound field coil than the old asbestos. The Deltatape treatment eliminates all short-circuits.

DELTABESTON Magnet Wire withstands excessive heat and moisture. It served on Seattle's motors 14 years without a breakdown.

D & W FUSES positively will blow without noise or flame. ALL cars

of the Interborough Rapid Transit Co., New York, use them exclusively.

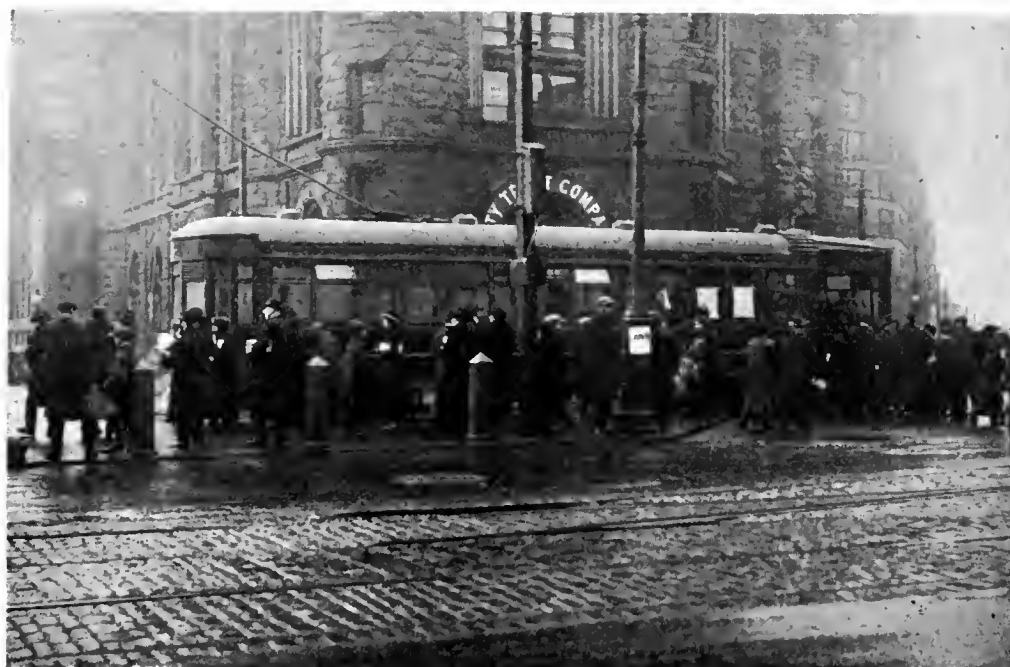
At any place D & W products will cut motor maintenance costs and reduce the greater though less tangible item of lost car-hours due to breakdowns in service. Remember the big three—

Deltabeston — Deltatape — D & W  
Fuses.



**D & W FUSE CO.**  
PROVIDENCE, R. I.





# Busy Buffalo Now Has National Pneumatic Door and Step Control

Fifty high-floor and fifty low-floor Peter Witt cars are helping to solve Buffalo's congestion problems.

Of course, National Pneumatic Door and Step Control are helping to make these modern cars produce quicker

rates of passenger interchange and better schedule speed.

It's significant that all Safety Cars and nearly all the Peter Witt cars have National Pneumatic Door and Step Control.

**NATIONAL PNEUMATIC COMPANY**

50 Church St. New York



515 Laflin St. Chicago

# Twelve things you would like to have your motormen do



Showing recorder location on one of the cars of the Connecticut Company

- |   |   |
|---|---|
| 1—Coast more.   | 7—Avoid running at too high speed.  |
| 2—Avoid unnecessary stops and slow-downs.             | 8—Guard against rear-end collisions.  |
| 3—Release brakes early after stopping on level track. | 9—Lessen the number of derailments.   |
| 4—Save power, brake shoes and wheel tires.            | 10—Report defects promptly—particularly defective brakes.                                 |
| 5—Start and stop smoothly.                            | 11—Use hand brakes occasionally—enough to keep this safety feature in good working order. |
| 6—Maintain proper headway.                            | 12—Operate cautiously and safely.   |

## Equipment of your cars with the **Arthur Power-Saving Recorder**

followed by intelligent interpretation to your men of the meaning of the records established and suggestions for making better records will rapidly educate your motormen to do these things. Big economies and greater safety will result.

**The Arthur Power-Saving Recorder Co.**  
New Haven, Conn.

*"Power wasted is the true measure of the motormen's relative efficiency"*



In 1825 this famous corner (Broad and Market Streets, Newark, N. J.)—now known everywhere as "*The Four Corners*"—was a mire. One of the Newark papers of that day asked sarcastically: "A traveler begs leave to ask the citizens of this handsome and flourishing town if it would not be beneficial and do them honor, to have at least one good road for carriages through the place?"

## Broad Street Was a Mudhole

in 1832, and horses and cows promenaded on Market Street in the afternoon, especially on Sundays. The first pavement was laid in 1853.

Newark is a splendid example of the stimulating effects of improved transportation. The enormous increase of city travel developed by street railway operation enforced a demand for better streets; the improved streets demanded cleanliness and better

houses; the new buildings attracted people from elsewhere—and now the "Four Corners" is a central point for a great city of more than 350,000 people.

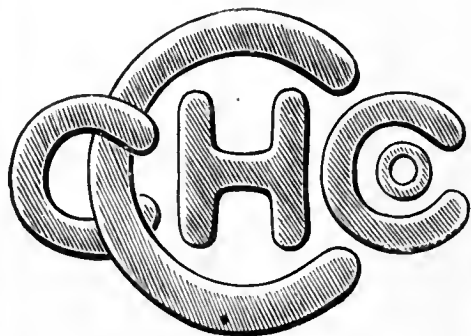
Street cars met with much opposition at first and for seven years after their introduction no cars could run on Sundays! A special plebiscite had to be taken in Essex County in order to sanction their Sabbath running in 1869.

## Galena Oils

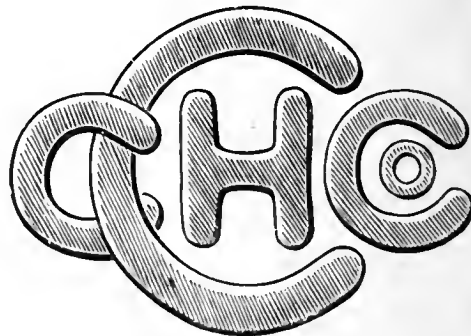
and Galena Service have long shown their worth on the Newark lines as well as on those toward Bloomfield, Montclair and the Orange Mountains, where the hilly territory makes heavy demands on the rolling stock. They are relied upon now as always to promote better transportation service throughout the country.

**Galena-Signal Oil Co.**  
Franklin, Pa.

# CONSOLIDATED



## DOOR ENGINE

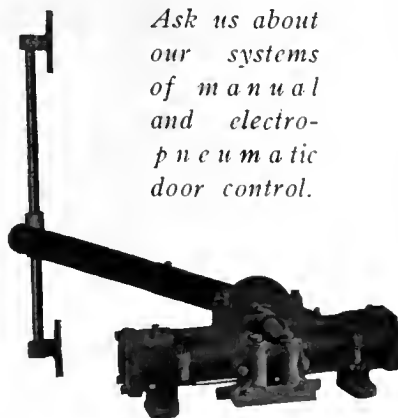


### A Tried and True Device for the New Railroading

Electric railways today are appreciating more and more the merit of handling door or door and step operation automatically.

The big thing is to get the car over the line fast by lowering standing time; and this can be done by using Consolidated Door Engines to relieve the guard or conductor.

*Ask us about  
our systems  
of manual  
and electro-  
pneumatic  
door control.*



Formerly Consolidated Door Engines were used only for the remote control of doors on big rapid transit cars.

Now, Consolidated Door Engines are being used on surface cars in order that the conductor may get his passengers on or off quickly and have more time to collect fares.

### No Car can be most Efficient without Pneumatic Door Engines

Consolidated pneumatic door engines embody necessary protective and anti-leakage devices, and are made to meet any desired combination of operating conditions, such as diverse opening and closing speeds, wide range of temperature, direct or indirect control, end or side door operation, etc.

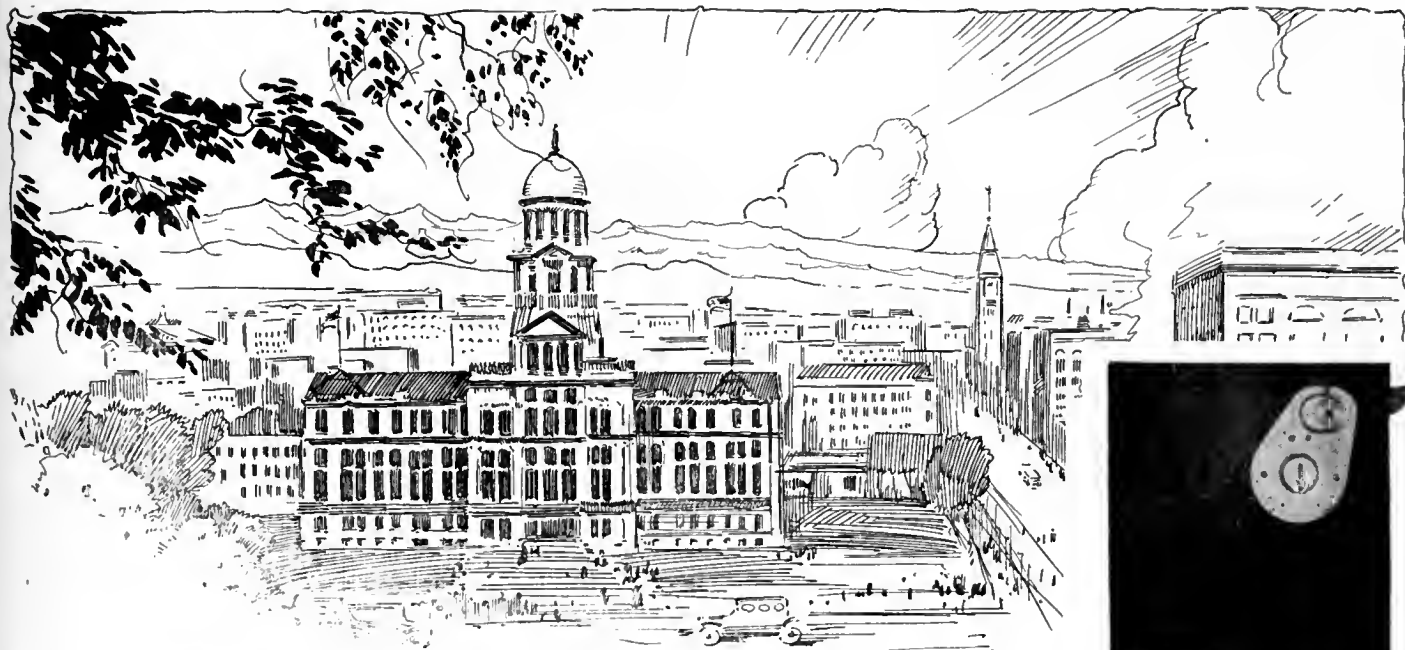
*Consolidated Door Engines are broadly Patented*

# Consolidated Car Heating Company

New York

Albany

Chicago



Denver State House



# Rico Coasting Recorders

at Denver Prove that  
Shorter Stops Mean Less Power

On a certain trip, the *Denver Tramway Bulletin* reports, a car making 5 stops per mile of 4 seconds each, coasted 31.2 per cent.

When the same car with the same schedules and rates of acceleration and braking was operated with 5 stops per mile of but 3 seconds each the coasting jumped to 43.3 per cent.

One Second Saved Per Stop  
Produced  
12.1 Per Cent Increase in Coasting

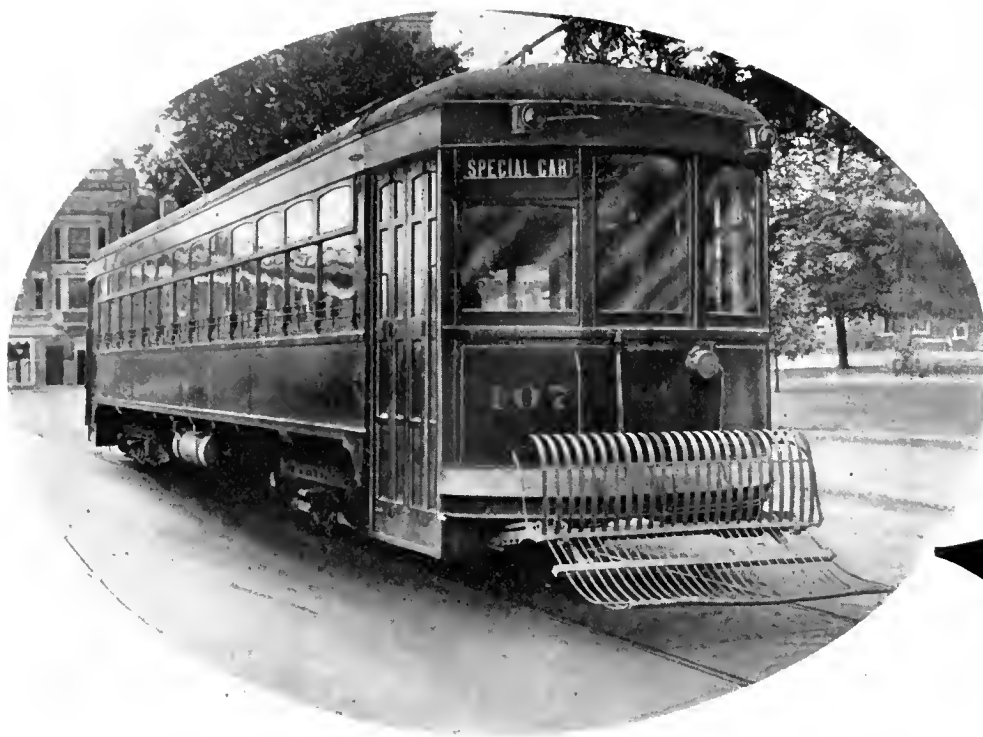
## Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO.



61 BROADWAY, NEW YORK





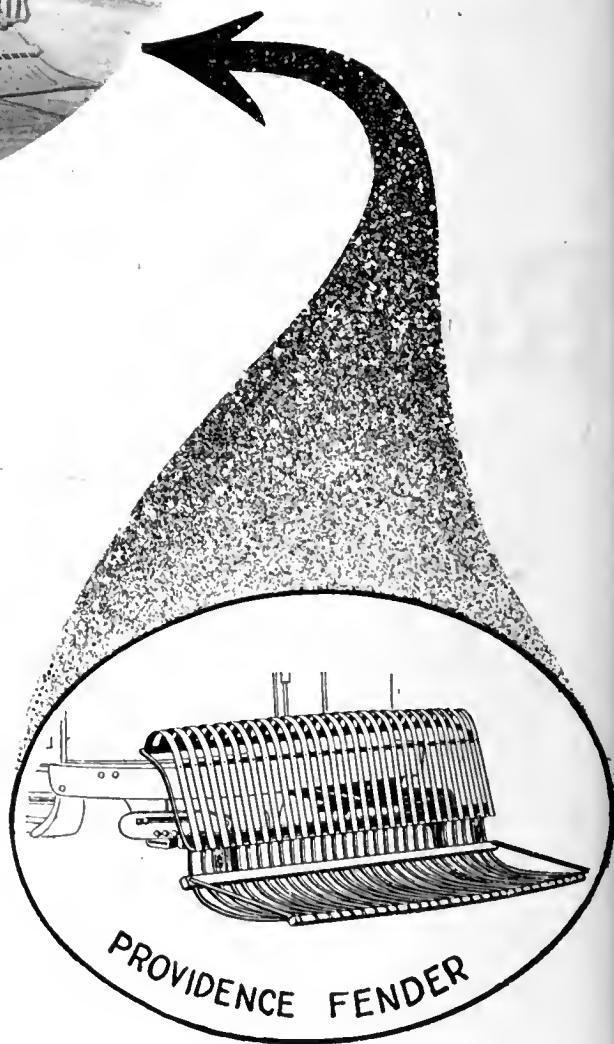
## For Suburban Service The Best Insurance Against Accidents

is yours when all your cars are equipped  
with

# Providence Fenders

For front-end accident prevention on lines with rough paving or none at all, Providence Fenders are unexcelled.

Where a projecting fender is not desirable, we recommend using H-B Life Guards.



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**The Consolidated Car Fender Co.**

Providence, R. I.

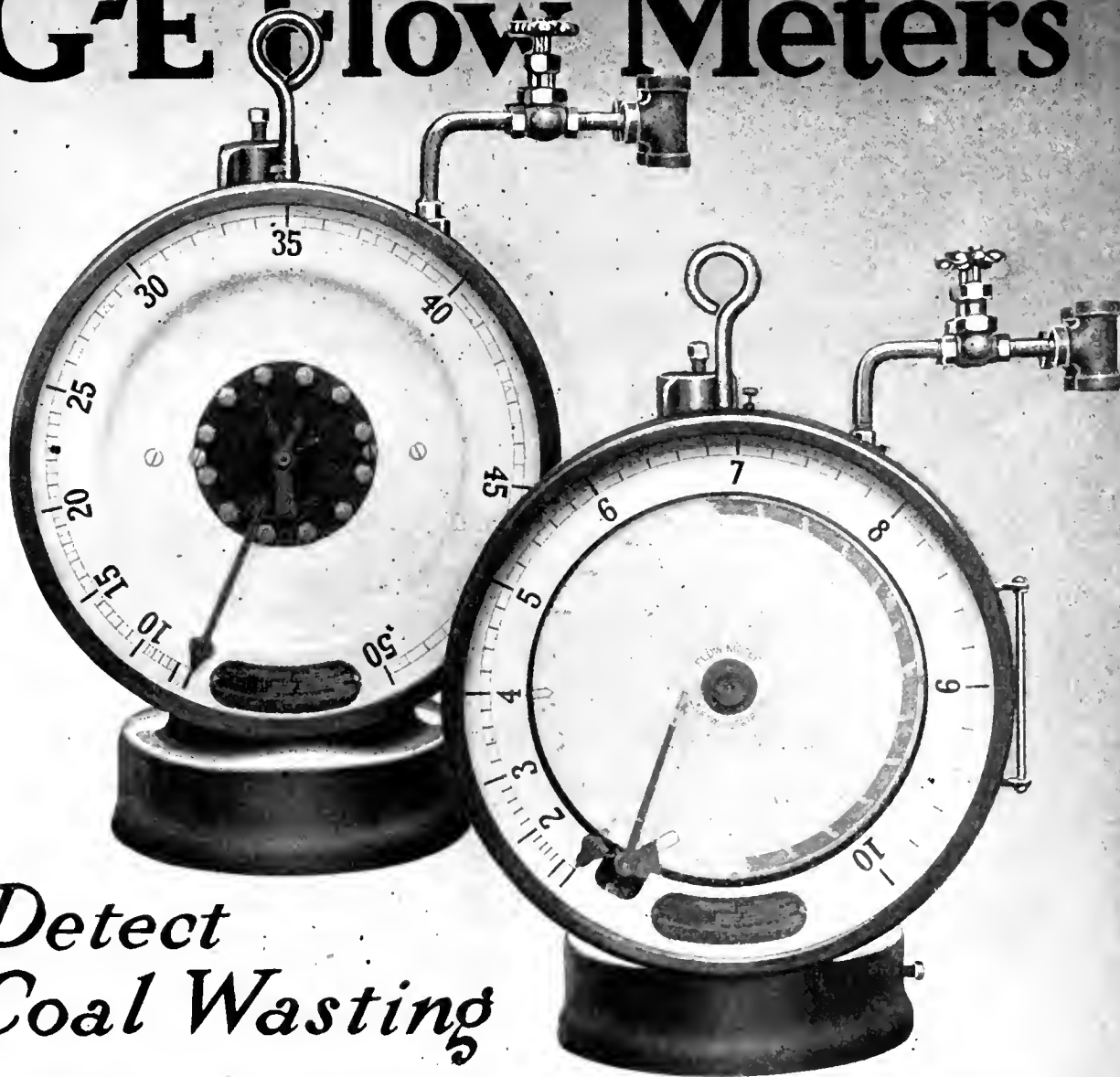
General Sales Agent

**Wendell & MacDuffie Co.**

61 Broadway, N. Y.



# G-E Flow Meters



## *Detect Coal Wasting*

The overloaded boiler plants and diminishing coal reserves place added emphasis on the general need in boiler plants for G-E Flow Meters.

These meters when installed on each boiler detect poor firing with its accompanying coal waste.

By installing them on your main steam lines to different departments it is possible to charge correctly for steam used, to detect wastes, etc.

Write our nearest office for bulletins and expert assistance in solving your problems.

7249

## General Electric Company

General Office: Schenectady, N. Y.

Sales offices in all large cities



# Splicing Sleeves



For a low cost, light weight splicing sleeve of exceptional strength, the R2 cannot be excelled.

LARGE corrugated wedges of forged steel hold the wire in a tight grip.

CLINCH ends transfer the trolley wheel from the wire to the sleeve without pounding or arcing.

THE trolley clearance on the under run is good.

## General Electric Company

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Baltimore, Md.  
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Charleston, W. Va.  
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Chattanooga, Tenn.  
Chicago, Ill.  
Cincinnati, Ohio  
Cleveland, Ohio

Columbus, Ohio  
\*Dallas, Tex.  
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Denver, Colo.  
Detroit, Mich.  
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\*El Paso, Tex.  
Fort Wayne, Ind.  
Hartford, Conn.

General Office: Schenectady, N. Y.

ADDRESS NEAREST CITY

\*Houston, Tex.  
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Jacksonville, Fla.  
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Kansas City, Mo.  
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Los Angeles, Cal.  
Louisville, Ky.  
Memphis, Tenn.  
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Minneapolis, Minn.  
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Salt Lake City, Utah  
San Francisco, Cal.  
Schenectady, N. Y.  
Seattle, Wash.  
Spokane, Wash.  
Springfield, Mass.  
Syracuse, N. Y.  
Toledo, Ohio  
Washington, D. C.  
Youngstown, Ohio

\*Southwest General Electric Company. For CANADIAN BUSINESS refer to Canadian General Electric Company, Ltd., Toronto, Ont.  
GENERAL FOREIGN SALES OFFICES, Schenectady, N. Y.; 30 Church St., New York City; 83 Cannon St., London, E. C., England

# Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 51

New York, Saturday, March 2, 1918

Number 9

## Give the Motorman Every Possible Chance

**A**T FIRST SIGHT there may seem to be a lot of "frills" in the control system which has been provided for the new six-motor, two-car trains of the Montreal Tramways. Details of the control system are given in an article by Keith MacLeod, printed elsewhere in this issue of the JOURNAL. If, however, this or any other arrangement serves to give the motorman more perfect control of his car a slight complication of wiring should not be permitted to stand in the way of its adoption. The multiple-unit control system is a wonderful success in heavy train service; it will work just as well with light, short trains if the equipment is properly installed and maintained.

It being granted, for purpose of argument, that an operator can have practically anything he wants from the manufacturers in the way of control, provided he is willing to pay a reasonable price for it, it follows that he ought to have one perfectly suited to his needs.

We are all preaching to the platform man at either end of the car the doctrine of high schedule speed, the highest speed consistent with safety. The essential for this purpose, after ample but not excessive motor power has been provided, is perfect control. If an analogy is wanted, we might compare the motors to the brute force and muscles of the car, while the control, with the motorman's brain behind it, is its nervous system.

As in the animal perfect co-ordination of brawn and brain is essential to productiveness and safety, so it is in the car. Formerly when the main circuit was taken through the controller any increase in power capacity of the car or train meant that more platform space must be given up to control purposes. With master control no such limitation exists, and any degree in refinement of control becomes possible. Hence, when we provide the best available control we give the motorman an opportunity to get the highest possible output from his car.

## Federal Commission to Investigate Labor Question

**T**HE threatened electric railway strike in Boston and others which have occurred during the past six months in other cities, emphasize the importance of the new federal National Industrial Commission which begins in Washington this week a study of "how to prevent strikes and assure a maximum production during the war of materials necessary to maintain the American armies in France." Presumably, the board will make an especial study of labor conditions on public utilities, because an interruption of railway or power service in an industrial community might easily cause more delay to munitions manufacture than a strike in a single munitions factory itself.

We are glad a national committee has been appointed to undertake this study, because the labor problem is undoubtedly a serious one on many electric railway properties. A large number of these companies, although their own finances have hardly warranted additional expenditure, have raised the wages of their men because of the increased cost of living. Nevertheless, it has been difficult in all cases to hold a full quota of men. This has been partly because there are many munition plants which can and do pay

more wages than can a public utility. It is also partly due to the fact that this is a time when jobs are seeking men rather than men jobs.

We hope that the new federal board will blaze a new path in labor investigation and will determine some logical and permanent basis for wages paid by a public utility, so that necessary increases will be reflected in increased rates granted to the utility. The reason for such an arrangement exists in the public interest in continuous service. The public, in fact, is a third party to every public utility labor agreement, and has a right to demand from labor, as well as from capital, the maintenance of efficient, satisfactory and safe service. Conversely, labor and capital have each a right to demand from the public an adequate return for their services.

## Utilities Must Be Maintained

**P**RESIDENT WILSON has spoken once more, with his usual incomparable breadth of vision and clear-cut understanding of fundamentals.

It is the vital importance of utilities to-day to which he has now directed his attention. He realizes their value and their needs.

Here is what President Wilson says, in a letter on Feb. 19, to the Secretary of the Treasury:

"I fully share the views you express regarding the importance of the public service utilities as a part of our national equipment, especially in war time. It is essential that these utilities should be maintained at their maximum efficiency and that everything reasonably possible should be done with that end in view. I hope that state and local authorities, where they have not already done so, will, when the facts are properly laid before them, respond promptly to the necessities of the situation."

## Public Improvements Should Be Deferred Wherever Possible

THIS is the season when the railways and municipalities are taking up their programs for the coming year's work. In ordinary times the railway would naturally consider in its program such items of public improvements in streets as new bridges and the like, which would in turn affect the railway tracks. Often railways have been forced to discard tracks and pavements which have several more years of useful life because of minor grade changes of streets to suit new types of pavements.

Managers and engineers can do a great work just now by getting in touch with civic officials and carefully considering this situation as applied to these times when every effort must be put forth to win the war. Men and materials are at a premium, and all unnecessary public improvements involving large expenditures by railways as well as municipalities must be eliminated. We have seen a number of instances during the year just past where pavements adjoining railway tracks have been completely renewed when a reasonably small expenditure for repairs would have put them in shape for at least two more years of service. The railways were compelled to co-operate in such wasteful practices to an extent which often prevented the making of improvements and repairs to tracks and pavements elsewhere far more urgently needed.

The municipal official must be shown that no business concern can now afford to make improvements or alterations requiring unwarranted use of men, materials and money which can by any possibility be avoided; that the public interests and the railway interests are one in the matter and that patriotism requires their close co-operation with one object in view, namely, Help Win the War.

## Keeping Track of Electric Railway Information

EVERY man in a position of executive responsibility, no matter how light this responsibility may be, must be in a position to get together, on short notice if necessary, reliable data in the field of his specialty. His ability to do so will often insure success where otherwise failure would be certain, and a recognition of this fact serves to explain the great interest of heads of departments and others in schemes for filing and classifying references. Each man must work out his own filing or indexing system, or at least must adapt the plans of others to his own circumstances. Ready-made schemes, while attractive, are apt to be too general and elaborate for individual application, and, obviously, simplicity is the first requirement in any scheme if it is to become a lightener of labor rather than a continuing burden.

Among the most interesting plans which we have seen lately is that in operation in the office of Arthur Gaboury, superintendent Montreal Tramways. Mr. Gaboury has selected fifty representative electric railways for special study and has assigned a division in a filing cabinet for each. Here he files clippings, pamphlets, etc., relating to each selected road, as well as reports and comments made by officials of the tramways company based upon their own observation of the several properties. As an endeavor is made to have

officials of the company become personally familiar with as many of these properties as possible the file has far more value than it would have otherwise. A simple card index supplements the data file, permitting a rapid and comprehensive topical study of the contents of the file. The important thing about Mr. Gaboury's plan is that it is not so comprehensive as to be unwieldy and at the same time the range of conditions covered is great enough to insure completeness. There are doubtless many other plans equally as effective and this one is chosen merely for illustration of a general principle. There is danger that the extent of the information on electric railway practice may seem so vast as to be bewildering, discouraging any attempt at systematic filing. However, any scheme faithfully carried out is better than none, and some scheme seems essential.

In the ELECTRIC RAILWAY JOURNAL editorial offices it has been found convenient to bind together extra copies of the indexes, permitting a rapid searching of the files. Some years ago a twenty-year index was compiled and published in book form, and this will be found useful for the early years. It will be a revelation to anyone who has never tried the JOURNAL indexes to do so and see the wealth of material published on practically every line of electric railway progress.

## Fare Petitions Should Be Based on Facts, Not Feelings

COMMISSIONS are not going to grant higher fares purely out of sympathy for utility managers. Regulators act according to the dictates of their brains, not their hearts. Furthermore, their brains function along the line of judgment, not imagination.

These observations seem worth while at this time lest some electric railway operator should take too much for granted in trying to secure financial relief for his company. In their private capacity, public service commissioners undoubtedly realize the general plight of the electric railway industry, but in their official capacity they can act only upon the evidence. Hence, if a utility expects to receive proper consideration, it must "prove in" its case.

Any good executive requires a subordinate to justify in detail his requisitions for material and labor, especially if they pertain to something new or radically different. Skeleton figures and personal opinions without material justification are not sufficient. The subordinate must show not only that a definite need exists, but also that other methods immediately available will not meet the need, and that the proposed method will do so, as nearly as it is possible to prophesy performance upon the basis of sound engineering and accounting practice and good common sense.

Commissions have the right to expect the same justification of applications for higher fares. Company officials should show the same carefulness, thoroughness and promptness in presenting rate cases that they require of their subordinates in handling requisitions. Each case must stand on its own merits, and complete preparation is needed to make such merits apparent. Mere guesswork, the sympathy gag, going off half-cocked—such practices are worse than useless. Only one thing counts in rate cases—facts. And the proper procedure is evident—get the facts, and then present them.

## Zone Fares Are Not a Primary Cause of Congestion

**B**EFORE entering into any discussion as to the relative money merits of a higher flat fare versus some kind of zone fare, electric railway men should determine whether there is any important connection between congestion in cities and use of zone fares.

A favorite bogey is the undoubted congestion in European cities. But is this really due to the zone fare? If it were, then the flat fare (2½ cents) of Berlin's street railways ought to result in a lower density of population than in Continental cities with the zone fare. This is not the case. Berlin is pre-eminently a city of big apartment houses. As a matter of fact, the high cost of land and the economy which it is necessary to practise in the use of building materials and fuel lead to close packing of large houses in even the smallest cities of western Europe. An American war correspondent wrote recently that in the reconstructed areas in France the farmers are more likely to live in a flat in the nearest village than to take up valuable land for a big, rambling house.

Still another cause for congestion in European cities is the historical fact that so many of them were once surrounded by walls and ditches for defense. The highly compact communities within these old limits have not broken up and spread in ratio with better transportation because comparatively little land is available, and the extent of the system of ground leasing instead of sale does not encourage a tenant to make improvements. Also, it is not uncommon for a forest reserve to hinder the natural growth of a city. From the foregoing it should be clear that the congestion of cities in western Europe, particularly, long antedates the zone fare or any other kind of fare. In short, the connection between congestion and zone fares is not particularly close.

To turn now to America, it is sometimes said that the flat or unit fare has been the prime cause that made it possible for many people to live in their own homes in the country instead of in unhealthy city tenements. Undoubtedly, this distribution of the population has been the greatest achievement of the American electric railway, but it has not been because of the flat fare, or certainly not primarily therefor. The main cause has been the existence of a good system of urban transit in a country where the restrictions of Europe on the use of land and material did not apply. The person who benefited most by these extensions of the service given for the 5-cent fare was the owner of suburban real estate. The car rider got more and better transit for the same nickel and the landlord got more income; while the railway acted as a philanthropist to both. The effect of these generous extensions on the flat-fare basis is too well known to-day to call for comment.

It is far from certain that a change to the zone fare will cause congestion. Chicago with a 5-cent fare has a higher density of population than Philadelphia with an 8-cent fare for a large proportion of riders.

People of foreign birth willingly pay an extra fare in order to live among colonies of their own people. Again, many thousands of Americans prefer a 25-mile suburban train ride and a zone fare to living in the city. Change from suburban to city life just now is due not to the question of fares, but to the shortage of domestic help.

To conclude: The topography of a city, the relative location of industrial and home sections, the cost of land, building materials and fuel, and the habits of the people are much more important factors of the amount of riding which is done than the rate of fare. In the 70's and 80's, when the combined fares by different companies in the same city for a present 5-cent ride were 10, 15, or even 20 cents, American cities had a larger proportion of homes with gardens than now. If the people in those times when the nickel was real money refused to huddle in crowds, they will not be deterred in these days of 15-cent milk from paying a zone charge of 2 to 5 cents more if they prefer life in the suburbs.

## Planning for the Future

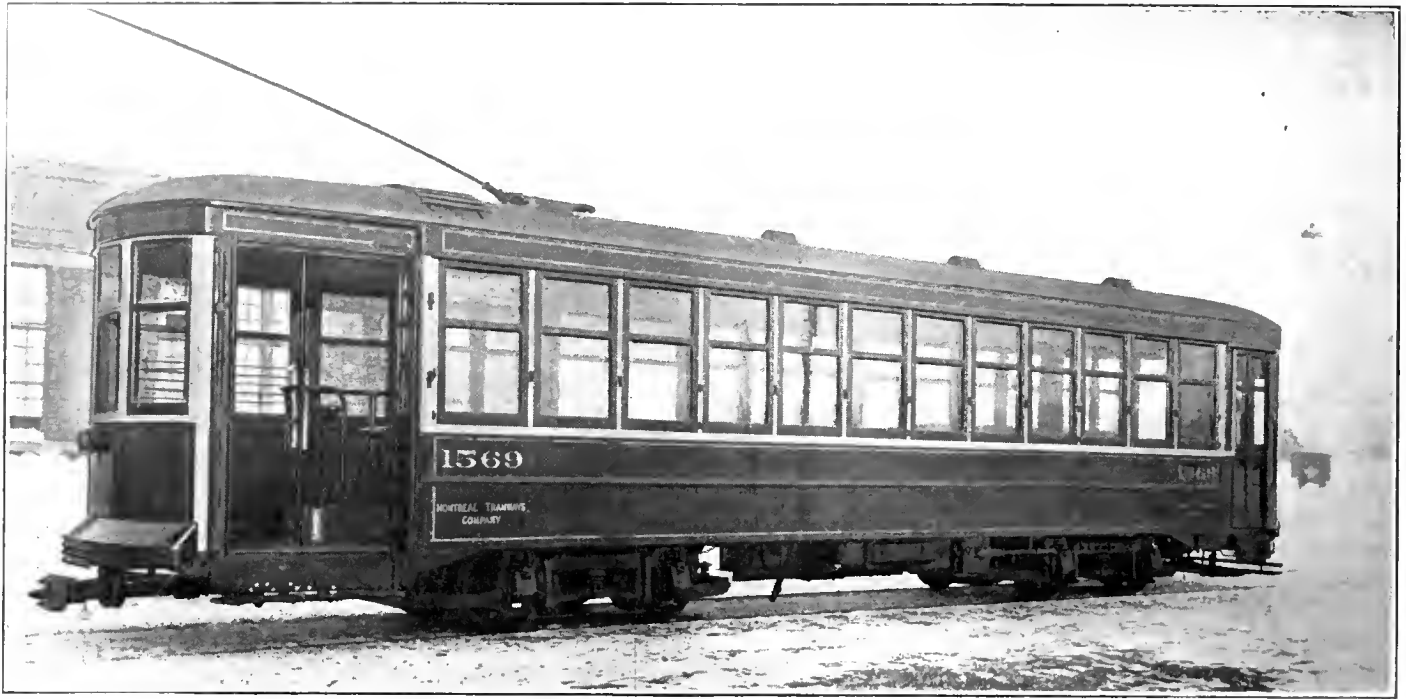
### More Important Than Ever Before

**T**HE time was when railway department heads could foretell quite accurately the requirements of their departments along both labor and material lines for several years ahead. Plans for new equipment or extensions of service could be laid with some confidence that at the proper time the equipment or whatever was needed for the execution of the plans would be available. This situation has been completely changed by the demands which the war is making on our industries and labor market. We may be able to predetermine our equipment and material needs now for six months or a year hence, but that ability does not insure our getting either the equipment or the labor wherewith to install or operate it. We may have plenty of trainmen and a sufficiency of common labor to-day, but who can say what we shall have to-morrow? We may have ample fuel to-day and for a month, but to-day's situation is no guarantee as to the situation two months hence.

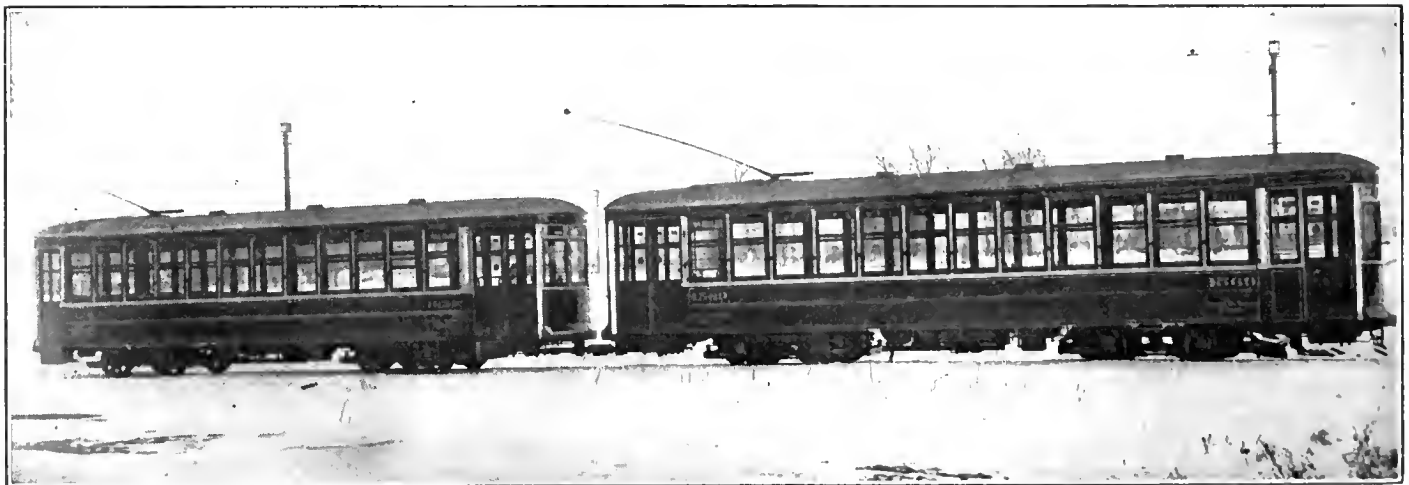
Railway officials are apt to be a conservative class of men. Men tied down as they are with the burden of routine work necessary for the safe operation of railways can scarcely be otherwise. But if our transportation systems are to continue to do an uninterrupted business, conservative action must at the very least be coupled with a radical use of the imagination. By this we mean that only by attempting to foresee and by planning to meet all possible future contingencies can railway service be kept at anyways near its present standard. This planning need not involve any considerable expense; in fact, it may need go no further than tentative plans laid out in the minds of the responsible officials. The average man reacts quickly and effectively in an emergency only if he has carefully rehearsed in his imagination the emergency and his plan of action relative to it. He then tends to do the right thing automatically. Even the layman understands that trainmen, central station attendants and others who are often required to face emergencies must receive special drill and training to fit them for the work.

During the war our transportation systems will be compelled to face many new operating conditions and emergencies. While no doubt the higher officials of every railway in the country are striving to foresee future contingencies, we wonder if the rank and file of those holding the minor positions of authority are giving the matter the attention it should receive. They should begin to think about it if they have not already done so.

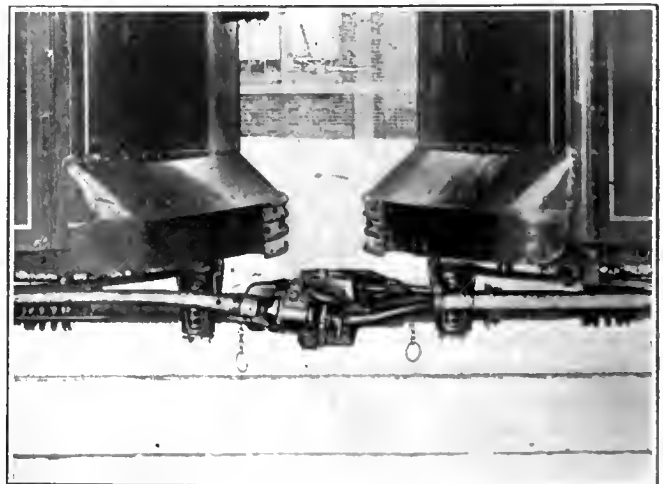
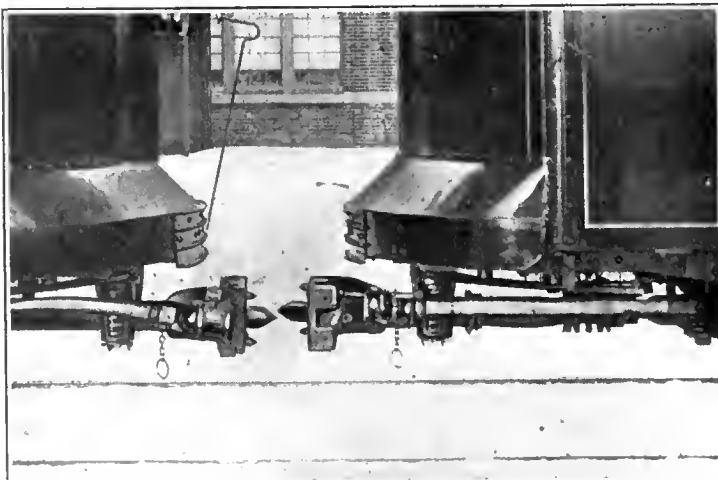




MONTREAL TRAMWAYS MOTOR CAR, SHOWING CONDUCTOR'S STATION AND TRAPS IN CONTROLLER COVER FOR CUTTING OUT MOTORS



TWO-CAR, MULTIPLE-UNIT TRAIN



ARRANGEMENT OF CONTROL CABLE JUMPER WITH CARS UNCOUPLED AND COUPLED

New Montreal Cars Designed for Multiple-Unit Operation



# Six-Motor Multiple-Unit Trains for Montreal

Two-Car Semi-Trail Operation on Grades Up to 13 per Cent—Multiple-Unit Control with Hand and Automatic Acceleration—Semi-Automatic Brake System—Emergency Opening Coupler—Air-Operated Doors with Safety Interlocking Control

By KEITH MACLEOD

Engineer of Equipment Montreal (Que.) Tramways

THE operation of trailers on the fairly level east and west lines of the Montreal Tramways has proved so satisfactory that it has been decided to place fifty new two-car trains on the north and south lines. As these lines are quite hilly, the maximum grade being 13 per cent, it was necessary to increase the motive power, and a two-car multiple-unit train was decided on as the most efficient and flexible arrangement.

It is in the control mainly that these cars differ from the former cars\* of the company. In general the new arrangement is a multiple-unit system with Westinghouse P-K-35-G controllers operated from storage batteries, each car having identical control with the ex-

tery voltage in the control cable, a very convenient arrangement of jumpers is possible.

The storage battery which operates the signal-light, buzzer and control systems is a standard 12-volt, 35-amp.-hr. automobile lighting battery, charged by a shunted portion of the compressor motor current. The shunt is adjustable, so as to allow the battery to be kept properly charged. The buzzers are connected so that any button will operate both buzzers, and the signal-light circuit is connected to the switches on each entrance door and on the emergency door at the rear of the trailer.

The control circuit is also grounded through the switches on the entrance and emergency doors, but pro-

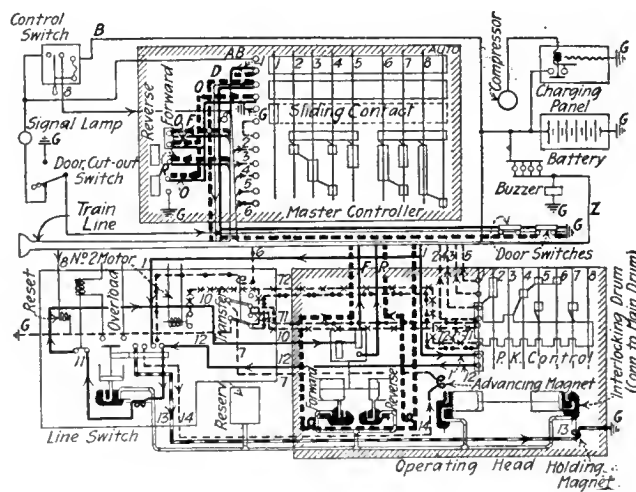
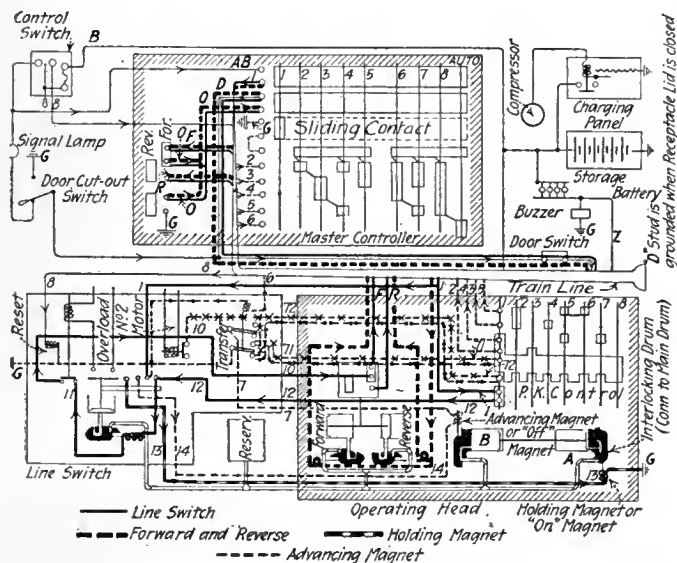


DIAGRAM OF ELECTRICAL CONNECTIONS ON FOUR-MOTOR CAR AND TWO-MOTOR CAR

For convenience in tracing the circuits they are indicated by different kinds of lines for the several controller positions, as listed below the left-hand diagram

ception of the rheostats. There are four Westinghouse 533-T-4 motors on the motor cars and two on the front trucks of the trailers. Although it is not intended to operate the trailers as independent units, it was desirable, since motors were needed on them anyway, to increase the operating flexibility by adding controls. There is no bus line, as it was feared that under Montreal winter conditions serious trouble would occur on a 500-volt jumper and that the current on grades would be too heavy for a single trolley. By having only bat-

vision is made for an independent ground on the control if for any reason the door circuit cannot be closed. When the door cutout switch is in use the signal-lamp circuit is open, which makes it necessary for the motor-man to obtain a definite bell signal before proceeding. The signal lamp burns only on the car from which the train is being operated and the switch carries a target as a signal to the street inspectors.

The control is provided with the usual line switch, overload and reset relays. A distinctive feature, however, is the combination of both hand and automatic acceleration. The connections on the master controller and the interlock drum are such that in hand notching

\*For previous articles on Montreal cars, see the following issues of ELECTRIC RAILWAY JOURNAL: Dec. 2, 1916, page 1163; Oct. 3, 1914, page 614; Feb. 14, 1914, page 367; Oct. 25, 1913, page 939.

the main controller will always follow to whatever notch the master controller handle has reached. There is an inherent time lag in the engine which prevents too fast feeding of the main drum if the motorman opens the master controller too quickly. Eight notches on the master controller correspond to the eight notches on the standard K-35 controller and the ninth notch connects in the automatic current limit relay.

In combining the hand and automatic features, it



FRONT VESTIBULE OF MONTREAL TRAMWAYS MOTOR CAR

was found necessary to incorporate what is termed a transfer relay, which separates the hand and automatic circuits without increasing the number of train-line wires. Without this relay there is a circulating circuit between the interlocks which, under certain conditions, will make unwarranted advances of the main drum.

#### CONTROL CIRCUITS

There are five distinct circuits in the control, namely, reset, forward and reversing, line switch, hand acceleration and automatic acceleration. The first three are easily followed from the diagram and it may be noted that the line switch will not close until the reversing engine has made the main controller correspond to the master controller. The method of accelerating consists of advancing and returning the main drum by differentials of air pressure and a double piston connected to the main drum through a rack and pinion. Whenever the line switch is in, air pressure is applied to piston *A* by means of the "On" magnet valve, and remains until the line switch releases. Whenever the "Off" magnet is energized, pressure on piston *B* reduces, and the main drum advances. Whenever the "Off" magnet is de-energized, pressure builds up in *B* and prevents further movement. The function of the accelerating circuits is therefore to provide means of properly energizing and de-energizing the "Off" magnet.

With hand acceleration the first notch merely closes the line switch, the main drum already being on the first notch. On the second notch of the master controller the "Off" magnet obtains its circuit from 1 on the line switch through 7 and 71 to the interlock drum, through 2 by the train line to finger 2 on the master controller and through the sliding contact to ground. The "Off" magnet being energized, the main drum commences to move, and as it moves, finger 2 on the inter-

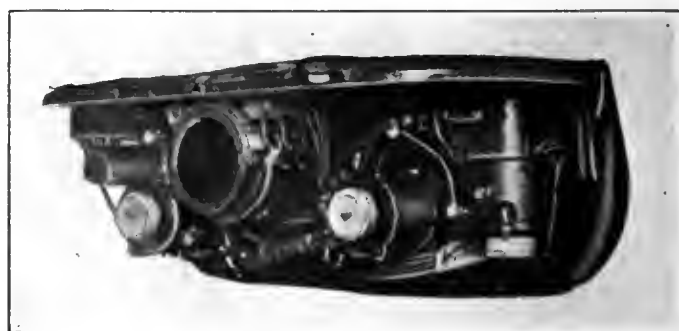
lock falls off, but 72 engages and carries the "Off" magnet circuit until it also falls off at position 2 of the main drum. Since no other fingers on the interlock and master controller now correspond, the "Off" magnet circuit is open, and the main drum ceases to move. Advancing the master controller to the third notch closes the "Off" magnet through finger 3 and so on through the range of hand notching.

Automatic acceleration is obtained by grounding No. 6 wire in the master controller, thereby lifting the transfer relay and connecting the "Off" magnet to the limit relay, the interlock being still used to insure that the main drum stops on definite notches. When the master controller handle is thrown off, the line switch circuit is open, the line switch releases, both "On" and "Off" magnets are de-energized, pressure builds up in *B* and decreases in *A* and the main drum moves back to the first notch.

An operating feature of interest in this combination hand and automatic acceleration is that if a motorman, using the automatic on a grade, finds the main controller has not reached full parallel, on account of the limit not dropping, he may move the master handle back two or three notches and work up by hand notching, the main controller being then forced to follow up.

The control wiring is installed in a combination of rigid and flexible conduit, straight lengths of pipe being used wherever possible, with flexible bends and turns. This proved to be much cheaper than either rigid or flexible work alone. Simple straight runs in rigid conduit are provided for the main cable, and a special design of junction box made for quick disconnecting is furnished for the motor leads.

The car bodies are of the same general design as those described in previous issues of the JOURNAL, the principal modifications being the addition of air engines, which are of National Pneumatic Company make, to operate the entrance doors and of a ventilating sash in the front vestibule to take care of mild days in the spring and fall when the storm sash is still on. Under certain weather conditions wet driving snow or



PK CONTROLLER OPERATING HEAD

sleet will freeze on a storm sash, while if there is only a single pane the heat of the car will melt the sleet and keep the motorman's vision clear. An arrangement of the front storm sash has therefore been made which will allow the permanent windows to be lowered independently.

The conductor's station was made to conform with the design worked out in connection with the application of folding doors and steps to the older cars of the company,

# Interurban Cars Slow Up City Service

## Third Section of the Beeler Report on Washington, D. C., Recommends That the W., B. & A. Line Be Terminated in Suburbs Instead of in Congested District

**T**HE third section of the report of John A. Beeler on transportation conditions in Washington, D. C., was issued on Feb. 14. This section deals with the problems occasioned by the operation of the heavy electric interurban cars of the Washington, Baltimore & Annapolis Electric Railroad over the conduit tracks of the Washington Railway & Electric Company's Columbia line into the very heart of the city. Mr. Beeler notes the increase of traffic congestion at the busiest two traffic centers of the city, Fourteenth and Fifteenth Streets and New York Avenue, and the delays caused to the city patrons of the Columbia line. In order to overcome the present serious difficulties, he recommends that the interurban cars be stopped at a point almost 3 miles out, until such time as terminal facilities not interfering with city traffic shall be built outside the congested district.

The Washington, Baltimore & Annapolis Electric Railroad operates a high-speed interurban line between Washington and Baltimore, a distance of 40 miles, with a 20-mile branch line from Annapolis Junction to Annapolis. Prior to 1910 the Washington terminus was at the White House Station, at Fifteenth and H Streets, N. E., 2.82 miles from the Treasury. In 1910 the interurban line was re-equipped and the construction of the conduit track of the Columbia line was strengthened in order that the cars could be routed through to the terminus at Fifteenth Street and New York Avenue opposite the Treasury.

According to Mr. Beeler, the point where the interurban cars stand at the city terminus of the line is precisely where the throat of the Capital Traction Company's system is the most contracted and the greatest

congestion exists. The operation of the Baltimore cars over the Columbia line of the Washington Railway & Electric Company also causes congestion at the neck of this system, on Fourteenth Street between F and H Streets. Furthermore, the interurban road is the cause of innumerable delays and interruptions to service on the Columbia line.

The square on New York Avenue between Fourteenth and Fifteenth Streets contains four car tracks, two belonging to each of the principal companies in the city. The line of the Washington Railway & Electric Company terminates in two stub tracks, which do duty as a terminal for three important lines of the city system as well as the Baltimore cars.

The time-table of the Washington, Baltimore & Annapolis road calls for forty regular trains per day in each direction using the terminal at Fifteenth Street and New York Avenue. According to schedule the time allowed at this point is five minutes per car. Observations show that one or more of the interurban cars are standing at this congested point practically all through the day. Out of a total of twelve hours and twenty-four minutes during which observers watched the street, one or more interurban cars were standing there nine hours and thirty-four minutes, or 77 per cent of the time. The average time each car stood there was nineteen minutes and one second. Since the cars are taken to Fourteenth Street before loading is permitted, it is seen that this space in Washington's busiest center is used only as a storage track.

The action of the interurban road in allowing its cars to stand thus in the street, Mr. Beeler says, is in direct violation of a most commendable regulation of the police department. This regulation states: "A driver of a street car shall not allow it to stand upon a street for a longer period than five minutes unless the way is obstructed."

The loading of the interurban cars at Fourteenth Street is slow. As the car steps are high and narrow, the ingress of passengers is a laborious performance. This is especially true in this case, as the passengers are nearly all burdened with luggage. Observations show that the boarding time is three seconds or more per passenger. Frequently 100 or more passengers board a single car at this point, requiring from five to six minutes. Meanwhile the car is standing on the main line and blocking the track for the city cars.

### INNUMERABLE DELAYS TO PATRONS OF COLUMBIA LINE

The situation is aggravated by the delays occasioned to the city cars on the Columbia line. The delay sheets kept by the Washington Railway & Electric Company show that during recent months the delays of the Washington, Baltimore & Annapolis cars within the District of Columbia were as follows: October, eighty-two delays totaling 677 minutes; November, 127 delays total-

*(Concluded from page 404)*

as described in the Aug. 18, 1917, issue of the *ELECTRIC RAILWAY JOURNAL*, page 262, and an extra stanchion was placed in the front of the motor car.

Other features of the new cars are the lighting, which is furnished by five 93-watt, 120-volt lamps with reflectors and Electric Service Supplies Company compensating fixtures which shunt in an equivalent resistance when the lamp burns out, the thermostat controlled heaters and the Brill 76 E trucks with 30-in. wheels, bolster guides and a graduated spring system.

The brakes on the cars are the semi-automatic system with straight air for service and automatic for emergency application. Safety stops on the cylinder levers are arranged to insure braking on one truck in case of failure on the other. An American slack adjuster is provided which, with one take-up on the dead lever of each truck, takes care of all shoe wear. Conductor's valves are installed on both cars and an attachment on the coupler is provided which opens the emergency line when the drawbar swing becomes abnormal, as for instance if the strain splits a switch.

ing 1092 minutes; December, eighty delays totaling 752 minutes.

During this period an average of three and one-tenth delays was recorded for each day. The average duration of the delays amounted to twenty-seven and one-half minutes daily. When it is considered that the scheduled headway of the city cars on the Columbia line is twelve cars per hour during the midday period, and forty-eight cars per hour during the morning rush, the seriousness of these ten, twenty and thirty-minute delays becomes apparent. A ten-minute delay during the period of maximum travel holds up eight cars of the city lines, thereby delaying perhaps 800 people.

These delays of interurban cars practically all occur on the conduit tracks within the city proper. In Mr. Beeler's opinion, they are due to four principal reasons, namely: (1) Complicated and heavy equipment; (2) Lack of thorough inspection and systematic repairs to rolling stock; (3) Shortage of competent and experienced motormen; (4) Faulty condition of tracks and defective conductor rail.

The interurban cars are 50 to 57 ft. long and weigh from 78,500 to 79,800 lb. empty. To Mr. Beeler's mind it is not surprising that this equipment with its numerous 600-1200-volt trolley-conduit complications is subject to frequent breakdowns under the present shortage of skilled operators and mechanics. Furthermore, these heavy cars, in operating to Fifteenth Street, and New York Avenue, are doing so under conditions with which this equipment should not be expected to cope. There are no less than thirty compulsory stops on the short round trip between the White House Station and the Treasury, an average of five and one-third stops per mile. For a thorough interurban car weighing between 45 and 50 tons loaded, this is bad. In addition to these compulsory stops other stops are made for passengers.

#### INTERURBAN CARS SHOULD STOP FARTHER OUT

Mr. Beeler recommends that the interurban cars of the Washington, Baltimore & Annapolis Electric Railroad be denied the use of the conduit tracks west of the White House Station at Fifteenth and H Streets, N. E., until such time as the following necessary improvements, all of which are essential to the proper operation of these interurban cars, are made:

1. Terminal facilities that will permit the interurban cars to load and unload on separate and independent tracks shall be provided so as not to interfere with the free passage of a city car. Such a terminal should preferably be on a loop over which city cars will not operate.

2. The terminal should be located east of Fourteenth Street, N. W., so that the Baltimore cars will in no wise interfere with the congested traffic on Fourteenth and Fifteenth Streets. This is for the benefit of the patrons of the two city traction systems and also of vehicular and pedestrian travel.

3. Thorough inspection and adequate maintenance of equipment of the interurban cars must be provided to insure against the breakdowns and delays that are now of such frequent occurrence and so annoying to the citizens of Washington dependent upon the Columbia line for transportation to and from their work.

4. A sufficient number of competent and experienced motormen must be secured and carefully instructed in the proper handling of these heavy and complicated cars over the conduit tracks.

As the result of the elimination of the interurban cars from the heart of the city, the track will not be occupied by half-filled interurban cars during the height

of the rush period, and the space thus made available can be used to advantage by the city cars and their passengers. The effect of this change on the Washington Railway & Electric Company will be that more local cars can be put through on the Columbia line and an improved and more regular service maintained. This company must provide sufficient additional equipment to care properly for the interurban passengers between the White House Station and the Treasury.

Passengers of the Washington, Baltimore & Annapolis road will be slightly inconvenienced, because they will have to change cars at the White House Station. In Mr. Beeler's opinion, however, this requirement, under the circumstances, is not unreasonable. Most of the passengers come by trolley or other vehicle to the present terminal at the Treasury. In short, this requirement is no more than that imposed upon the passenger who arrives at the Union steam railroad station. In fact, the use of the White House Station will have its advantages for patrons, as it would be much easier for them to board the high cars from flush platforms, which can readily be provided at this station.

At first thought, Mr. Beeler states, it might be presumed that the exclusion of the interurban cars would have a damaging effect on the Washington, Baltimore & Annapolis road, but this road is now handicapped by a lack of facilities to handle the traffic being forced on it by the Camp Meade cantonment and Annapolis activities. Sufficient cars and men are not available to care for the present business. By terminating its cars at the White House Station, from two to five cars and crews will be released for an increase in the service on the remainder of the system. Little or no expense need be incurred by the company to take care of the new arrangement, as it already maintains a waiting room at the White House Station. To terminate all the interurban cars there will be simply to revert to conditions that existed eight years ago.

### 35,000-Kw. Turbine Wrecked in Boston Station

**A**BOUT 4.55 p. m. on Thursday, Feb. 14, the 35,000-kw. horizontal, single-cylinder steam turbine in the O Street station of the Boston Elevated Railway exploded, so completely wrecking the machine that it will be sold for junk as it stands, it is reported. Fortunately no one was killed or injured. The trouble developed in the low-pressure stages—the seventeenth, it is believed. All diaphragms and wheels, together with the blades from this stage on to the twentieth, were fractured and broken in many pieces and released with such force as to smash away the whole top half of the low-pressure end of the casing.

The initial cause of the accident is thought, at this writing, to have been excessive steam pressure between the diaphragm and the seventeenth wheel, concaving the diaphragm, causing it to foul the wheel, closing up the buckets and thus increasing the steam pressure at this point until the next diaphragm was similarly affected, when the whole low-pressure end let go.

The accident occurred at a time when 27,500 kw. carried by engines in another station of the railway company dropped their load. It is assumed that the wrecked turbine tried to take all of this load, opening its secondary valve to get all the pressure available.



# New Power Source for Columbus (Ohio) Railways

Station Has Large Units for Size of Community Served and Is Located Without Regard for Load Center—Most of Electrical Equipment Out of Doors—No Reciprocating Units Installed

THE Columbus Railway, Power & Light Company, Columbus, Ohio, has completed for operation the first part of its new Walnut power station, located on the east bank of Walnut Creek, about 10 miles southeast of the center of the city. This company operates the city railway system in Columbus, supplies light and power to the city and surrounding villages within a radius of 15 miles, and supplies power to some extent to the interurbans entering the city. It also furnishes considerable energy at the present time to Camp Sherman and the national army camp at Chillicothe, and also to the cities of Chillicothe and Circleville, about 50 miles south of Columbus.

The company has several old power stations, some of which are becoming inoperative, and all of which are located within the city limits. The new steam station became necessary owing to the large increase in the industrial load, and to the necessity of securing more economical operation. Due to the lack of suitable water for condenser purposes and of space for coal storage, a site outside of the city was selected, determined by the natural resources rather than the density of population.

Walnut Creek has a water shed above the plant site of approximately 500 square miles, and a natural pool at the station varying in depth at low water from 15 to 20 ft. The Hocking Valley Railroad runs approximately through the middle of the 25-acre property on

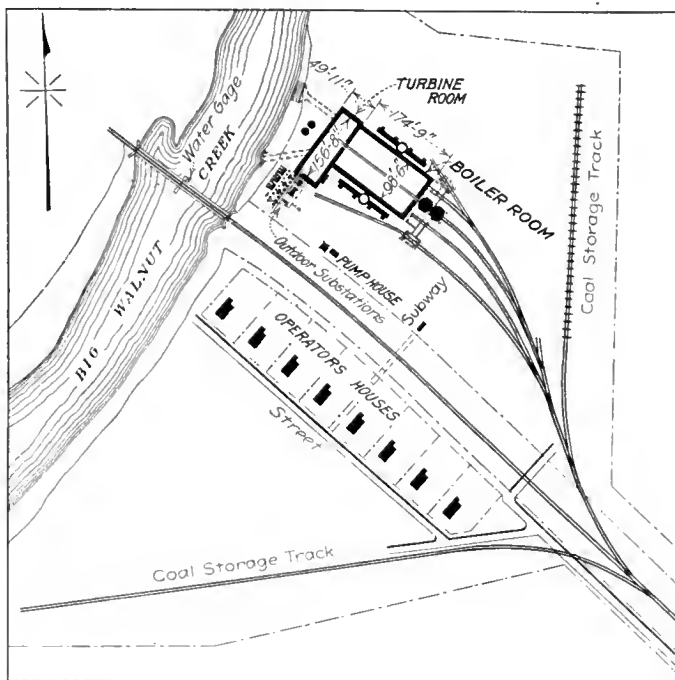


FIG. 1—PROPERTY MAP OF COLUMBUS RAILWAY, POWER & LIGHT COMPANY'S WALNUT STEAM STATION

which, in addition to the plant, will be built operators' houses and a large coal storage system. When coal is obtainable three or four months' supply will be carried in storage.

The generating equipment now in operation consists of one 18,750-kva., General Electric, 60-cycle turbo-alternator. The plans include a second turbine unit of 12,500-kva. capacity. Eight Babcock & Wilcox 440-hp. boilers are now installed, and eight more will be added later. The future equipment is under order and is expected to be ready for installation the early part of this year. Energy is generated at 13,200 volts and is

transmitted over three 39,400-volt transmission lines, and one 13,200-volt circuit, which feeds an industrial section at the extreme south end of the city.

The plant is laid out with the intention of having all equipment that requires attention on the main floor level. This applies to the switchboard, turbines, motors for driving circulating water pumps and hot-well pumps, controllers for all forced-draft, induced-draft and stoker drives, battery-charging sets, etc., giving little occasion for operators to leave the main floor for any length of time.

A noteworthy feature of the plant is that no reciprocating apparatus is used. The only steam auxiliaries are one steam turbine-driven feed pump and two steam-driven dry vacuum pumps. All other auxiliary equip-



FIG. 2—GENERATING END OF PLANT SHOWING INTAKE AND DISCHARGE TUNNELS AND FEED-WATER PURIFYING PLANT —INDUCED-DRAFT FANS AND WALL OPENINGS FOR ECONOMIZERS

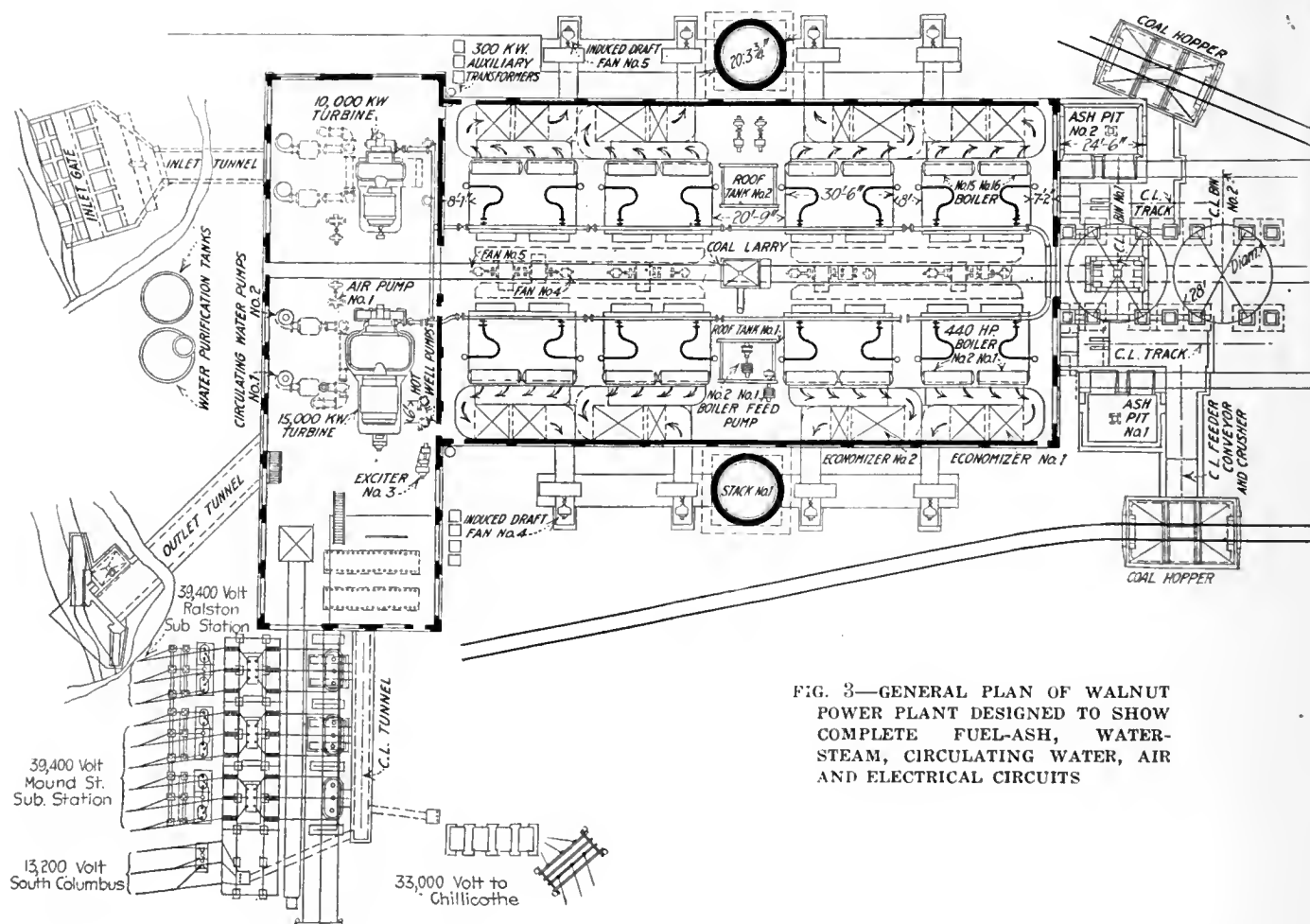


FIG. 3—GENERAL PLAN OF WALNUT POWER PLANT DESIGNED TO SHOW COMPLETE FUEL-ASH, WATER-STEAM, CIRCULATING WATER, AIR AND ELECTRICAL CIRCUITS

ment is driven by induction motors, most of which are provided with variable-speed control. Every motor or turbine, including the generating unit, has a flexible coupling.

Very little space within the station is used for electrical equipment, all transformers, high-voltage bus structures, main-line switches and lightning arresters being located out of doors. Any of this equipment, however, can be cut out of service for inspection and repairs, thus securing all the advantages of the outdoor type of electrical equipment with minimum disadvantage. The control is compact, and only the 13,200-volt switches are within the station.

In providing spare equipment the effort has been to make each unit complete so that it can be regularly operated. For instance, duplicate circulating-water pumps and condensate pumps are provided, the spare unit in either case being available for immediate service. The large alternator is provided with a direct-connected exciter, and a geared turbo-exciter set is installed for spare service.

The boiler plant, as previously stated, will ul-

timately contain sixteen boilers, each having a heating surface of 4440 sq. ft. These are designed for 250 lb. pressure, and are provided with Diamond mechanical soot blowers, Copes feed-water regulators and balanced-draft regulators. Bailey furnace meters are also used to record steam flow, air flow through boilers, temperature of exhaust gases and draft under stokers. The single-loop superheaters will produce about 150 deg. of superheat under average conditions.

The boilers are set two in a battery and the gases from each battery pass through 5/16-in. steel-plate flues, covered with  $\frac{1}{2}$  in. of asbestos, to one Green fuel economizer of 6300 sq. ft. heating surface. The gases

from each economizer are in turn conveyed from the economizer through uncovered steel breechings to one 60,000-cu.-ft.-per-minute Green induced-draft fan. The fans discharge downward into a concrete flue, located below grade, which connects with the base of a tapered concrete chimney of 150 ft. height and 14.5 ft. inside diameter at the top. Two such chimneys will be provided, each to accommodate four fans and eight boilers.



FIG. 4—STEAM END OF PLANT SHOWING COAL AND ASH-HANDLING EQUIPMENT



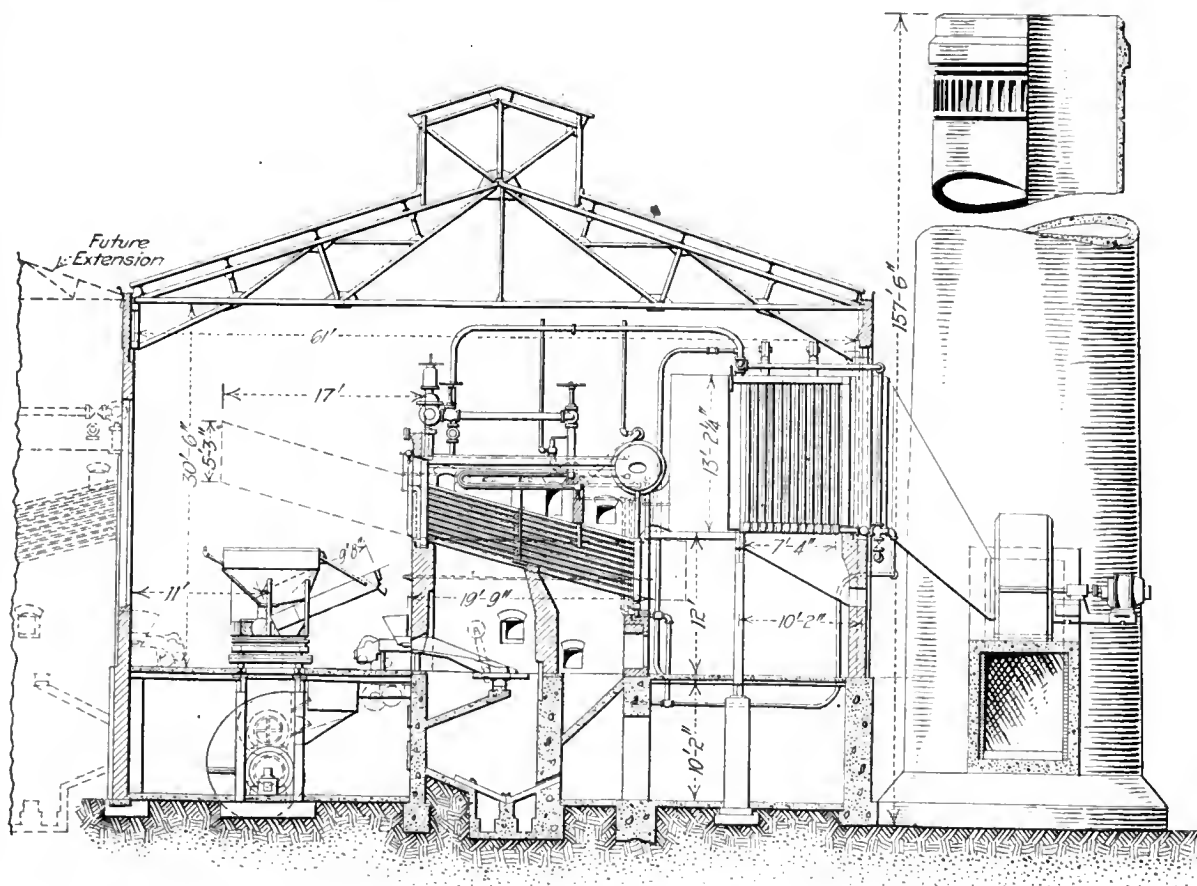


FIG. 5—CROSS-SECTION OF BOILER ROOM SHOWING ARRANGEMENT OF EQUIPMENT AND SCHEME FOR EXTENSION

The turbines are guaranteed for a water rate, under best conditions, of 11.35 lb. per kilowatt-hour on the 18,750-kva. unit, and  $11\frac{1}{2}$  lb. on the future 12,500-kva. unit. The steam equipment is arranged in units of two boilers and one economizer, the economizer having approximately 71 per cent as much heating surface as the two boilers. Each boiler is provided with one eight-retort Sanford Riley underfeed stoker. This gives a unit which is capable of turning out a maximum of 340 per cent of its nominal rating, according to guarantees by the stoker company. The battery of boilers therefore has a maximum capacity of 3000 hp., so that the station can generate approximately 7 kw. per rated boiler horsepower.

It should be noted that no by-passes are provided for the economizer, as it is expected to operate each unit of boilers with draft fans continuously. When it is necessary to make extensive repairs an entire unit will be shut down. Either one of the boilers may be shut down for cleaning without disturbing the operation of

the other. The economizers are provided with the usual scraper mechanism, one 5-hp. motor driving the scrapers on two economizers. The controllers for the motors driving the draft fans are located near the boilers and are under the control of the boiler-room operators. The balanced-draft equipment provides for close regulation of the induced draft, and the large steps in the adjustment of this draft are obtained by the variable-speed motors, which are hand controlled. The forced draft is also hand regulated by varying the speed of the motors and by the movement of the dampers in the air ducts.

The steam from the boilers is carried through 6-in. steam lines to a main 12-in. steam header for each row of eight boilers. The two headers are connected at each end so as to form a complete ring. In the same way the feed water will be supplied to the boilers from a 6-in. feed-water header for each row of boilers, and the feed-water headers will be connected to form a complete loop.

The economizers are operated in parallel, feeding di-

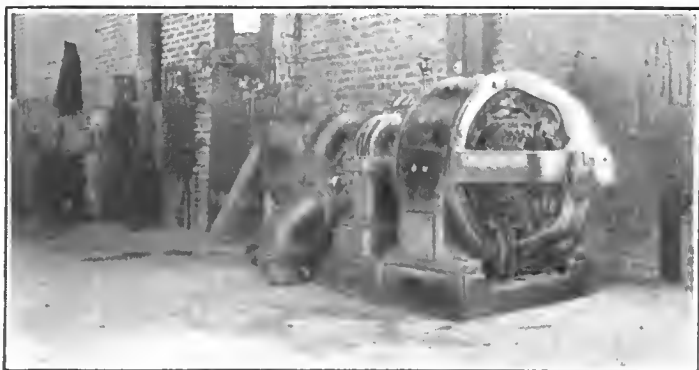
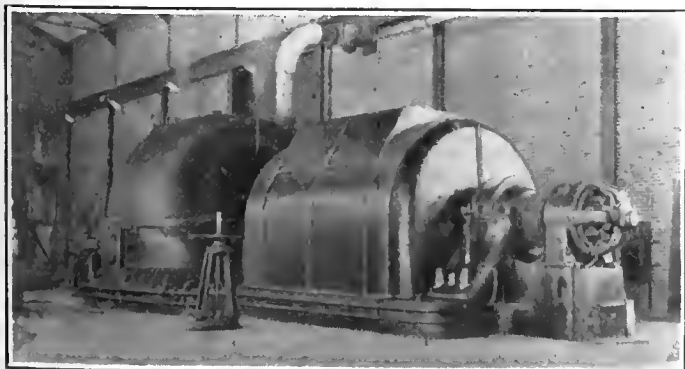


FIG. 6—18,750-KVA. TURBINE SET WITH DIRECT CONNECTED EXCITER—100-KW. TURBO EXCITER SET

rectly into the feed-water header, and to avoid unequal feeding Monel metal orifices are provided in the header between the connections to the economizers. It is expected to obtain fine adjustment of the feed to the economizers by regulating the opening of the valves in the connections between the economizers and the header, determining the adjustment of these valves by the temperature of the feed water leaving the economizers as shown by Bristol recording thermometers. These are

supplied for the gases leaving the economizers, for the water entering and leaving the economizers, and for that entering the feed-water heater.

The economizer arrangement is such that the access tubes and blow-off are on the outside of the building. Asbestos sectional covers are used over the outside of the economizers, and the opposite brick wall of the building is omitted. This arrangement provides for easy inspection and repairs and saves floor space. All steam piping is provided with steel flanges and Van-

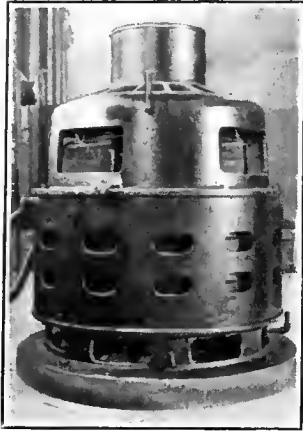


FIG. 7 — 120-HP. VERTICAL VARIABLE-SPEED MOTOR FOR DRIVING CIRCULATING WATER PUMP

stone joints, and welded nozzles are used wherever possible to eliminate joints and to make piping contact.

Coal passes from two track hoppers by means of a flight conveyor through a crusher and thence by bucket elevators to the top of two 400-ton coal bunkers located just outside the boiler room at the end of the station. The coal from the bunkers is carried into the boiler room by means of a 4½-ton traveling larry on a standard-gage track laid flush with the boiler-room floor. The larry is electrically operated, has a revolving bin which works like a turret, and is provided with a screw conveyor which supplies the boilers on either side of the firing aisle. It is operated by one man, is simple in construction and all wearing parts are easily accessible for repairs. Track scales are provided under one of the coal bunkers so that all coal can be weighed as it is taken into the station. This will permit the keeping of an accurate record of coal used by any boiler or for the entire station during any desired period.

To provide against shortage of coal, through lack of cars or irregularity of shipments, an elevated storage track is provided, which is 480 ft. long and elevated approximately 15 ft. above the ground level. The track is carried on reinforced concrete piers, 14 ft. between centers, and is supported between piers by I-beams, with steel cross members on 5-ft. centers to prevent spreading. The coal will be distributed over the ground and reloaded into cars as needed by means of a 15-ton Brownhoist steam-driven locomotive crane equipped with a 2-yd. grab bucket.

The ash pits are formed by the concrete foundations of the boilers. Two drag-chain conveyors pass under each row of eight boilers conveying the ashes out to the end of the station and discharging them into a clinker crusher, which in turn discharges into the boot of a bucket elevator. This elevator can discharge into a concrete ash pit, a railroad car or a wagon. The ashes

can be disposed of for a long time in grading around the property. Although each conveyor has sufficient capacity for carrying out the ash, duplicate conveyors are furnished so as to permit repairs or changes without inconvenience to operation.

The circulating water for the Alberger surface condenser under the turbine is supplied by duplicate vertical variable-speed motor-driven pumps. These pumps receive water from a gravity tunnel, which extends under the entire length of the turbine room. The water from the condenser discharges into another gravity tunnel, which also extends under the turbine room and carries the water out into the river at a point about 160 ft. below the intake. Each condenser is provided with duplicate motor-driven single-stage centrifugal condensate pumps. The concrete tunnels under the turbine room eliminate the usual large amount of piping required for circulating water and also conveniently supply the water with a minimum waste of power. The water in the tunnel will have a velocity of 2 ft. per second with the two turbines carrying full load and about 3.1 ft. per second with 40,000 kw. of turbine capacity in operation. The discharge water lines from the condensers are sealed in the discharge tunnel so that advantage is taken of the syphon action obtained.

The intake end of the tunnel is enlarged and provided with a large area of racks for the water to flow through

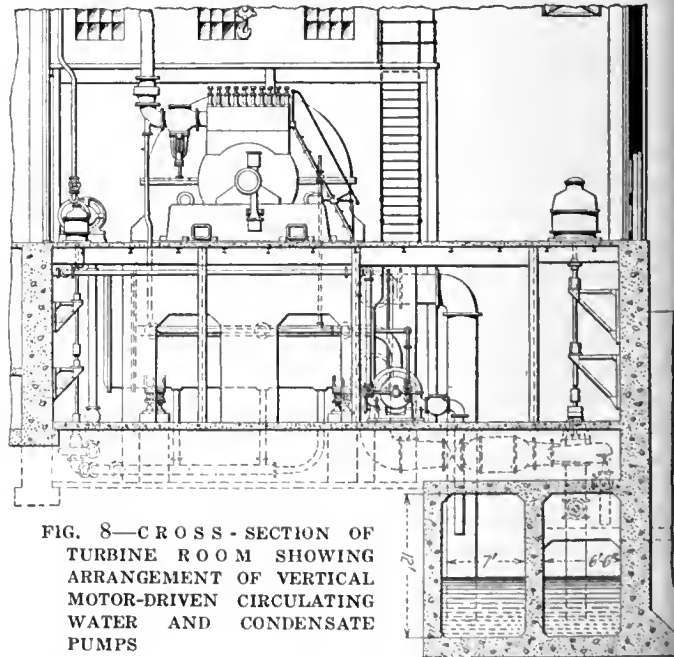


FIG. 8—CROSS-SECTION OF TURBINE ROOM SHOWING ARRANGEMENT OF VERTICAL MOTOR-DRIVEN CIRCULATING WATER AND CONDENSATE PUMPS

The velocity through these racks will be ½ ft. per second for the first two units and 0.8 ft. per second for 40,000-kw. of turbines in operation. There are also provided six large removable wire baskets of 1-in. mesh, designed to catch leaves, twigs, etc., that may come downstream during high water. Each basket is in a separate compartment provided with a gate for shutting off the flow of water when the basket is raised for cleaning. A traveling hoist is provided for operating the gates and baskets. Any material that passes through the baskets and racks can be removed before reaching the condenser by means of Elliott twin strainers having ⅜-in. holes and located between the circulating water pumps and the condensers. The circulating water pumps are placed on top of the intake tunnel so that a minimum suction lift of 11 ft. is secured.

The condenser of the unit now installed is bolted direct to the exhaust flange of the turbine without any expansion joint. Car springs are placed below the condenser and so compressed as to balance the weight of the empty condenser. These springs will allow the condenser to expand when heated, and the turbine is capable of taking the additional weight of the water

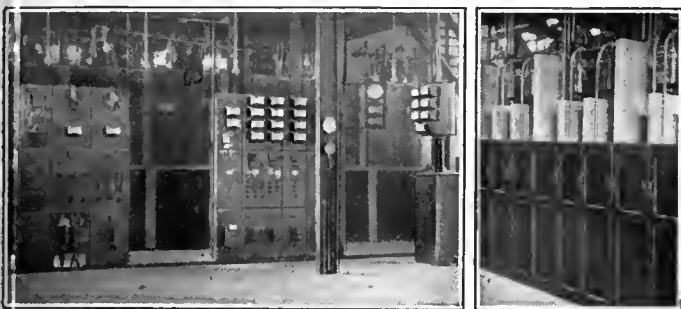


FIG. 9—SWITCHBOARD PANELS AND BUS STRUCTURE—DETAIL VIEW OF 13,200-VOLT SWITCH CELL

which may be in the condenser during regular operation.

The condensate from the condenser is forced by the centrifugal pumps to the top of the boiler room, where it flows through water meters into an open storage tank. This tank is divided into two compartments, one with a capacity of 6000 gal. for condensate and the other with a capacity of 3000 gal. for make-up water. The water from the tank flows through a Hoppes open feed-water heater having 1300 sq. ft. of heating surface. The feed-water heater is divided into two parts; the condensate passing over one-third of the heating surface and the make-up water over the remaining two-thirds.

From the heater the water passes through a battery of four 400-gal. per minute four-stage Cameron centrifugal boiler feed pumps. Three of these pumps are motor driven and one is steam driven. The pumps discharge into headers supplying the economizers, which carry full boiler pressure plus the additional pressure required for forcing the water through the economizer to the boilers.

To supply the make-up water for the boilers, that is, water in addition to that secured from the surface condensers, a lime and soda ash feed-water purifying plant is installed. This plant consists essentially of two 20,000-gal. wood stave tanks with stirring mechanism, and an elevated dosing tank. The river water is of fairly good quality except during high water when it may be quite riley. A battery of four 200-gal. per minute motor-driven centrifugal pumps is located in the basement of the turbine room for furnishing water to the feed-water purification plant and for cooling bearings and transformers.

#### MUCH OF THE ELECTRICAL EQUIPMENT PLACED OUT OF DOORS

In general the electrical system is that which is considered modern practice for the potentials at which it operates. The alternator is connected to a 13,200-volt bus through a General Electric, type H3 oil switch. A transfer bus is provided so that any 13,200-volt switch with its instrument transformers can be cut out when necessary without interrupting service. All feeders and other circuits have oil switches of the same type and all

of them are remote-controlled from the switchboard. The turbine controls are also located on the switchboard.

Energy is transformed from the generated voltage of 13,200 to 39,400 volts by means of 15,000-kva., three-phase, 60-cycle, water-cooled, outdoor type transformers, two units of which will be installed this year and a third at a later date. All of the 39,400-volt switches, lightning arresters and connections are located outside of the station. Electrical energy for Columbus will be received at 39,400 volts at one point for the present, and at a second and a third point later on, and will be distributed in the city between substations at 13,200 volts. The primary voltage for all other light and power customers is 4150 on a four-wire distribution system. The tie lines between the principal substations of the city operate at 13,200 volts and consist of triple-conductor lead-in-cased cables laid in vitrified clay duct subways.

The Walnut station was designed and constructed by the E. W. Clark Management Corporation, through whose courtesy the foregoing illustrations and data were obtained.

### Who Put the Nick in the Nickel?

A CURRENT bulletin issued by E. J. Cooney, executive assistant Rhode Island Company, Providence, R. I., in the interest of a 6-cent fare contains a presentation of the "rising costs" question that will undoubtedly be of interest to other railway men. The material is shown by the accompanying illustrations and the following paragraphs:

"For some years past electric railways have been suffering under burdens placed upon them by various municipalities in the form of taxes, etc., until investors have looked upon them as questionable security.

"But the situation became really serious in 1914 when war broke out in Europe, shocking the whole world. As the months passed all lines of business



#### Rising Costs

- I am speed personified.
- I am gradual, with never a rest.
- I affect both the rich and the poor.
- I attack persons or objects, showing no partiality.
- I come from unseen quarters and leave a wide trail.
- I shake the foundations of the greatest giants of business.
- I find no structure so great as to be able to withstand my assaults.
- I am always victorious.
- I am Rising Costs.

TWO PAGES OF "RISING COST" BULLETIN ISSUED BY RHODE ISLAND COMPANY

became affected by a sturdy youth named 'Rising Costs.' As he grew he stretched out his tentacles and pulled in one commodity after another, until he reached the public service utilities.

"Nothing was too big for him to tackle as he went onward, and the electric railways began to feel the effects of his attacks. The nickel that for so many years gave them profits on their huge investment began to weaken, until 'Rising Costs' cut a nick in the nickel that greatly reduced its value"

# Connecticut Company's Power-Saving Campaign

Systematic Educational Work Has Reduced Energy Consumption Per Car-Mile by 11 Per Cent in Five Months—  
Best Records on Each Line Are Recognized by Substantial Prizes

BY WILLIAM ARTHUR

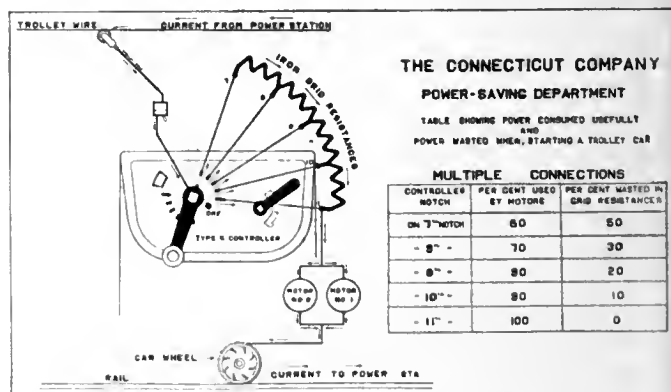
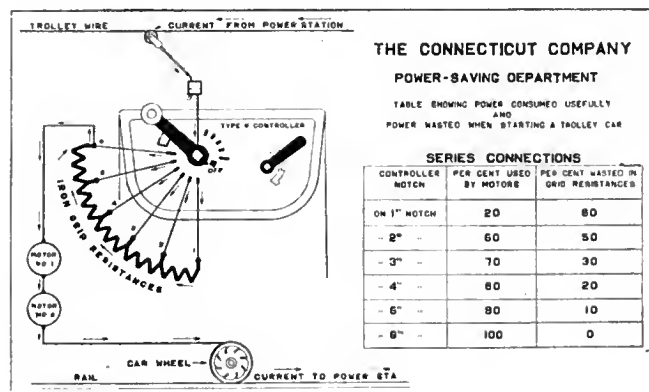
Electric Railway Engineer, New Haven, Conn.

SEVERAL months ago the officials of the Connecticut Company, as part of a general move toward greater economy, decided to see what could be done further to reduce power and maintenance bills, particularly those caused by faulty operation on the part of motormen and conductors. It was realized that the power wasted in car operation was considerable, and an effort was made to determine just how considerable the waste was. It was also realized that the problem of getting men to change the ingrained habits of years was no easy matter, and that the task must be done thoroughly or not at all.

It was decided to create a power-saving department in the company, putting an engineer in charge, and to

his assistant. Men were expected to know the company rules, observe safety precautions at all times, avoid abuse of equipment, and operate as economically as possible.

This was good so far as it went, but in the matter of power saving the instructions were not specific enough. Too much reliance was placed upon individual judgment as to the proper methods to be employed in this direction. The chief motorman on one of the big divisions is usually a very busy individual, upon whom devolves the duty of breaking in new men, including the teaching of all rules relating to signals, emergency work, etc. He usually has little time to study the fundamental technical principles of power saving, much



INSTRUCTION CHARTS DESIGNED TO IMPRESS ON MOTORMEN THE MAGNITUDE OF RHEOSTATIC LOSSES  
FIG. 1—SERIES POSITIONS OF CONTROLLER; FIG. 2—PARALLEL POSITIONS

have him work out his problem in conjunction with the company officials. The writer was retained in an advisory capacity in connection with this work of organization.

## REVIEW OF CONDITIONS EXISTING BEFORE THE CAMPAIGN STARTED

The Connecticut Company employs about 2500 platform men and operates approximately 1100 passenger cars. Its lines cover most of the State of Connecticut, connecting New Haven, Hartford, Bridgeport and Waterbury, together with about seventy smaller towns and villages. For company purposes, this territory is subdivided into nine operating divisions. Each division, therefore, operates some city and some interurban services.

The platform men employed by this company compare favorably with men of similar class in other sections of the country. All motormen had received preliminary training at the time of employment. In a general way, also, their work had been checked up from time to time by the chief motorman of each division, or in the case of the four larger divisions, by the chief motorman and

less to impart these principles to the men under his charge. As a result many of the most elementary principles and conceptions are either not understood at all, or at most they are understood very imperfectly by the men on the cars. In this particular the conditions existing on the Connecticut Company property prior to the power-saving campaign were probably fairly representative of the conditions existing on similar properties throughout the country. This point is enlarged upon because the success achieved in any power-saving campaign will depend largely upon the clearness with which those organizing it visualize the state of mind of the men whose habits it is desired to correct. Consider only a few of the ideas which are current among motormen throughout the country.

1. Practically all believe that the controller turns on the power "gradually," much in the same way that a faucet turns on water. This to anyone without special training is a very natural thought, but is a fundamental misconception which of itself is productive of a frightful amount of waste. This point will be further dealt with.

2. Some motormen are taught that in notching up a



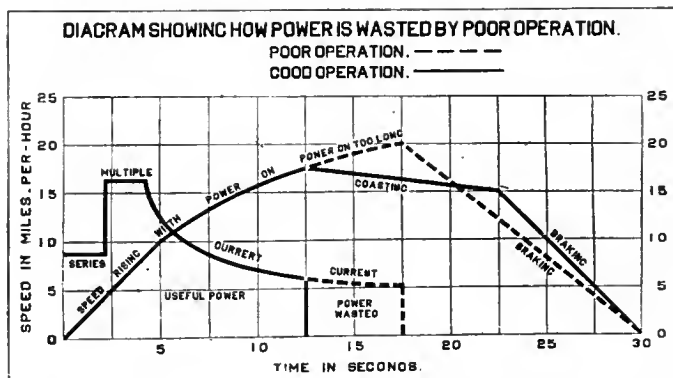
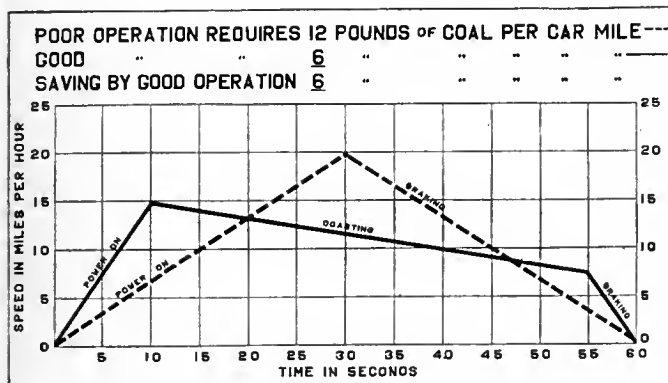
controller, the full car speed possible on any notch must be reached before passing to another notch.

3. Many believe that in starting the car fewer motors are in operation when the controller is in series than when it is in multiple.

4. Others are convinced that when motors are connected in series those nearest the controller, and which

saving recorders"; an educational campaign was started, and means for following up the motormen's daily records were devised. Particulars of these three features will now be dealt with.

The educational work comprised four distinct features: (1) Special instruction of the chief motormen; (2) the issuance to all motormen and conductors of a



DIAGRAMS USED IN VISUALIZING CAR OPERATION LOSSES IN POUNDS OF COAL—FIG. 3—TO SHOW EXTREME CONDITIONS; FIG. 4—TO SHOW USUAL CONDITIONS

therefore "receive the power first," do most of the work—and so on.

This list of popular misconceptions could be much extended, but the instances given are typical of the kind which are common, and which, to some extent, must be removed before real progress in power saving can be made on any property.

*The essential thing is to change the habits of the motormen operating the cars, if a power-saving campaign is to be effective.* But habits cannot be changed until wrong ideas have been supplanted by correct ones. Once the men are in a frame of mind where they are willing to save power (and this condition of mind can be created) they must then be shown how. *A power-saving campaign is therefore primarily an educational matter.*

#### A WORD ABOUT CHECKING DEVICES

Next to education a checking device is most essential; in fact, the two features are complementary. There must be provided some means of recording and comparing the men's individual efficiency from day to day, otherwise no permanent benefit will follow from the educational effort. Men forget rules or become careless or indifferent, or they operate carefully only while watched, or while under the surveillance of the chief motorman or other official. Some constant stimulus to good work must be provided, otherwise their interest lags. The only means so far devised for creating and keeping up this interest is to put on the car some instrument which will permit comparison to be made between the individual performances of groups of men doing similar work, *i. e.*, of men working on the same route or under the same general conditions. By this means a competitive spirit is created, and by simple follow-up methods can be maintained.

The three essentials, therefore, for a successful power-saving campaign are: (1) Education of motormen. (2) Use of a checking device. (3) An effective follow-up system.

All three features were employed in the campaign herein described. The cars were equipped with "power-

small educational folder, containing power-saving rules; (3) personal instruction of motormen on the cars by the chief motorman or his assistant; (4) illustrated talks to groups of motormen at meetings specially held for this purpose.

As a part of the instruction of the chief motormen, meetings were held weekly, at which men from all divisions were in attendance. At these meetings the fundamental principles of power saving were carefully explained and discussed. Many deep-rooted ideas held by these men, however, could not be removed by mere discussion. It was necessary to show them, on a car, that large savings can actually be made by slight changes in methods of operation of controller and brakes.

Tests were therefore made on specially equipped cars, and the different ways in which power could be wasted and saved were shown in such manner as left no room for dispute or personal opinion. These tests

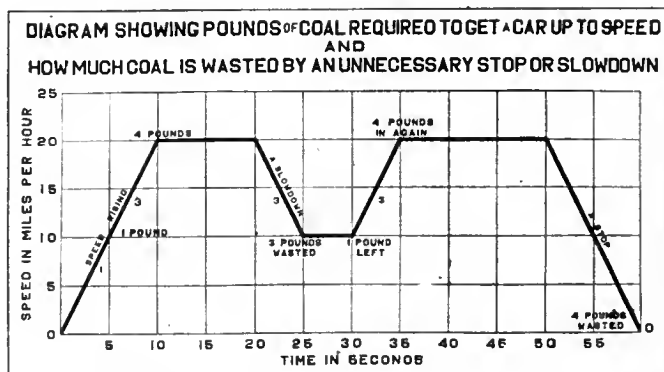


FIG. 5—DIAGRAM TO DISCOURAGE THE MAKING OF UNNECESSARY STOPS AND SLOWDOWNS

were carried out by the chief motormen themselves, under the supervision of the writer, and were of the greatest assistance in imparting to these men a spirit of enthusiasm and confidence.

As illustrating one of these tests, a car was operated in city service on a definite schedule making six complete trips in the way in which it would be handled by

an average motorman. No attempt was made to exaggerate conditions or produce a result such as would be obtained by a very poor motorman. For instance, the controller was notched up without noticeable dawdling on the resistance notches, a certain amount of coasting was done and the brakes were applied and released in the ordinary manner. The power consumption was metered by the chief motormen themselves on every trip. Six runs were then made over the same route, making the same number of stops and running on the same schedule, but with the car handled in the new way in which the men had been instructed, and again the power consumption was metered.

Upon comparing the results, to the intense surprise of the men, they found an average difference of 25.7 per cent in energy consumption. In another test they found an average difference of 32.5 per cent. No further argument was necessary.

FOLLOWING UP THE INITIAL EFFORTS

The introductory portion of the educational folder containing power-saving rules is reproduced herewith. This illustrates the general style, and also tells something of the method of awarding prizes for meritorious work which was adopted. Several prizes are awarded quarterly on each division and range from \$5 to \$2 each. At this point it is not necessary herein to enlarge upon these rules, as they are given in the writer's article in the issue of this journal for Sept. 2, 1916.

On the four large divisions, New Haven, Bridgeport, Waterbury and Hartford, the assistant chief motorman assumed the chief part of the burden of instructing the motormen in the finer points of power saving.

On the smaller divisions this duty was carried out by the chief motormen themselves. These men were required to ride with each motorman in turn, and impart to him in a practical way the proper methods of handling his controller and brakes, giving in simple terms the reason in each case.

less habits and good habits were shown, the effect upon the coal pile being explained in each case. These talks were entirely non-technical. For instance, no reference was made to "kw.-hr.," the unit of "pounds of coal per car-mile" being used instead. The abstract conception of "kw.-hr." is absent from the minds of most motormen, but they readily grasp the idea of "pounds of coal per car-mile."

Questions were encouraged, and many interesting discussions took place, in which the motormen joined. The local manager, the superintendent, and other officials, would often be present and take part in these discussions.

Motormen evince the liveliest interest when new ideas are presented to them in a simple manner. For instance, the idea that a controller does not throw on power gradually, but draws from the trolley wire substantially the same amount on each series notch,

is a brand new idea to most of them. The charts shown in Figs. 1 and 2 are used to illustrate this point and to show the large percentage of waste that takes place on certain of the controller notches. It is a startling thought to most motormen that on the first notch four-fifths of the power is wasted in the resistance and only one-fifth used by the motors in starting the car. Emphasis is, of course, laid upon the need for more coasting, and usually brings forth from the men the questions: "How can I coast more and not lose time?" The many ways in which this can be done are then explained, and the fact is emphasized that some of these ways require the conductor's help, whereas others do not. It is shown that the whole secret of obtaining a good coasting record is in learning to save a few seconds here and there, and then using these seconds for more coasting. The following suggestions are typical:

HOW TIME CAN BE SAVED

1. By being alert in responding to the bell.
2. By notching up more quickly.
3. By braking at a higher rate.
4. By helping the passengers in and out and so saving a second or two at the stop.
5. By not arriving at the end of the line ahead of time in order to get a longer lay-over.
6. By starting on time.
7. By stopping at the right place so that the passengers won't delay the car by having to walk some distance to the doors.
8. By the conductor calling out the streets in a clear voice so as to permit quicker unloading.

Methods for notching up the controller are dealt with in considerable detail. The rules given regarding this may be summarized as follows:

THE CONNECTICUT COMPANY

TO MOTORMEN AND CONDUCTORS

The cost of every item used on the Street Railway has gone up. Coal, wages and everything else, but the public pays no more for a ride than it did years ago. It is therefore, necessary to further economize in every department.

One of the chief items of expense is coal to make the electricity that runs and heats the cars. When we save electricity we save coal. How can electricity be saved?

THE WAY TO SAVE ELECTRICITY IS TO COAST MORE, USING GOOD JUDGMENT IN STARTING AND STOPPING THE CARS, SO AS TO GIVE MORE TIME FOR COASTING.

If you save only four seconds by notching up a

car. This report must be handed in each day at expiration of the day's work.

The following rules show in detail the way in which cars can be operated to the best advantage. Talk these over with your conductor for he can help you by giving the starting signal promptly and in other ways. The men who use the best judgment in carrying out these rules will get the best record.

J. K. PUNDERFORD,  
V. P. & G. M.

Dec. 15, 1917.

FIG. 7—CLIPPINGS FROM FIRST AND THIRD PAGES OF INSTRUCTION BOOK ON POWER SAVING

THE CONNECTICUT COMPANY												
Motormen's Daily Time and Power Saving Report												
Date _____ 191__												
POWER-SAVING REPORT												
State below the readings of the recorder each time you take or leave the car.												
BRAKING PERIOD												
	CAR NO.	CAR NO.	CAR NO.	CAR NO.	CAR NO.							
Start												
Ending												
STOPS AND SLOWDOWNS												
Start												
Ending												
Number of hours on each car	Hrs. : min.	Hrs. : min.	Hrs. : min.	Hrs. : min.	Hrs. : min.	Hrs. : min.	Hrs. : min.					
Remarks												
TIME REPORT												
	REGULAR TIME		OVER TIME		TOTAL TIME							
Run No.	hrs.		hrs.		hrs.							
" "	"		"		"							
" "	"		"		"							
" "	"		"		"							
Total	"		"		"							
Name _____ No. _____												
(OVER)												

FIG. 6—COMBINED TIME AND POWER-SAVING DAILY REPORT FORM

The educational campaign was further rounded out by a series of informal meetings at which from thirty to 300 motormen and conductors at a time were instructed. By the use of large charts, some of which are herewith reproduced, the differences between care-



1. Run with resistances in circuit as little time as possible. This means notching up at as fast a rate as a proper regard for safety, for the comfort of the passengers and the care of the equipment will permit.

2. In starting a car move quickly over the resistance notches to the first running point, wait there for a short time, then move quickly until the full multiple or last notch is reached. This waiting until moving into multiple has three good effects. First—It enables a motorman to move more quickly over the multiple resistance notches, and so saves power. Second—It reduces the strain on the controller. Finally—It reduces the draft of power and strain on the transmission lines and power station.

3. Don't, however, notch up so fast as to spin the wheels and pull out the circuit breaker, as this will waste power just as much as the old way. Use good judgment in this as in everything else. When the rails are slippery, adjust operation accordingly.

Proper methods of applying the brakes were then explained and for convenience the rules regarding this are summarized as follows:

1. Apply the brakes at as low a car speed, and at as high a rate as is possible, having regard to safety, to the comfort of the passengers and to the care of the equipment. Slow down the car without jerks; avoid "fanning the air" and whenever possible make one application do the work. Release the brakes a little just before the final stop. This will avoid a jerk, and will reduce trouble from flat wheels.

2. Making a quick stop saves power just as making a quick start does, but in a different way. A slow stop loses time in one block, and so leaves less time for coasting in the next, or in a later block. "Fanning the air" aggravates this, and in addition wastes still more power by requiring the more frequent pumping up of the air reservoir. Fast braking doesn't mean stopping the car so fast as to lock the wheels. Good judgment will tell what is right in this as in everything else. Adjust the braking rate to suit the rail conditions from day to day.

One of the first serious sources of waste in car operation consists in running too close to the car ahead, and so being forced to make unnecessary stops and slow-downs. In this connection it is pointed out that it takes about as much power to start a car once as will keep it running for a quarter of a mile on level track; so that unnecessary stops are very wasteful. Motormen are required to note that the word "unnecessary" is used. All proper brake applications as dictated by safety and the needs of the public should, of course, be made. Only the "unnecessary" ones should be eliminated.

Some unnecessary brake applications were then indicated as follows:

1. Those caused by running too close to the car ahead, when the second car might just as well be a short distance behind.

2. Those caused by approaching cross streets, curves, etc., at too high speeds.

3. Those caused by not keeping a good lookout for teams and other obstructions ahead.

Correct operation in each of the above three particulars not alone saves power but obviously increases safety of operation. This point is emphasized. The effect of unnecessary brake applications upon brake-shoes, wheels and rails is then gone into, and the connections between these and power saving pointed out.

#### MAKING THE POSSIBLE SAVINGS DEFINITE

In discussing the chart shown in Fig. 3 it is pointed out that the difference between good operation and careless operation can be as high as 6 lb. of coal per mile. This at 100 miles a day can make a difference of more than 100 tons of coal per year. Six pounds of coal per mile does not look very much to a motorman, but when translated into "100 tons of coal per year" it acquires a new meaning. This is the difference between

the best and the worst men. The average amount to be saved, of course, is less than this.

Conductors are encouraged to attend these meetings for the reason that motormen's efforts at power saving can be very much influenced by the way in which the conductor performs his portion of the duties. The best results come only from good team work on the part of both men. As a guide to conductors, the following suggestions were made:

1. As soon as the car starts, call out in a clear voice the name of the next street or stopping point, so that as early as possible passengers may signify their desire to stop.

2. Give the stop signal early. The bell in time will often prevent the motorman from throwing power on unnecessarily and so avoid waste of power.

3. Make the stop as short as possible, having regard to the safety and convenience of the public. All time saved at stops can be used by the motorman for extra coasting and so will help in saving power.

4. Avoid excessive use of heating current. It takes about one-third as much power to heat a car on a winter's day as to run it. An overheated car is more disagreeable to the public and more unhealthful than one which is too cold. Avoid waste in this as in everything else.

#### THE FOLLOW-UP SYSTEM AND ITS RESULTS

Motormen are supplied with a combined time and power-saving daily report form which is reproduced herewith. The time-slip portion of this is similar to that used prior to the power-saving campaign. The other portion has been added and provides space for the motorman to write down the power-saving recorder figures each time he joins and leaves the car. These reports are handed in each day and are then allowed to accumulate for two weeks. They are then classified into routes, so that all men whose records are in any way comparable may be grouped together. The records for each route are then totalized and the average efficiency figures found for all men operating cars on this route.

Each man's record is compared with this average, thereby making it possible to classify the men in the order of their merit. Rating lists, showing each man's standing, are posted twice a month, and by this means a spirit of competition is created and kept alive. Men showing constantly at the bottom of the list receive special attention from the instructors.

The results of the power-saving campaign have been gratifying. The division first equipped with power-saving recorders (New Haven) has shown a consistent and constantly increasing reduction in kilowatt-hours per car-mile month by month, totaling at the end of five months nearly 11 per cent. It is expected still further to reduce the power consumption and gradually to achieve the same, or better, results on other divisions, some of which are but now being equipped with recorders.

What has been achieved is not the result of any one man's individual effort. It has resulted from the loyal co-operation of many local managers, superintendents, chief motormen and others. Similar results can be obtained wherever the same team-work is possible.

The cost of the uniform worn by the women conductors on the New York Railways is \$5.75, made up as follows: Coat, \$2.75; bloomers, including puttees, \$1.75; cap, \$1.25. The uniform is made of khaki material. A photograph and a description of it were published in the issue of this paper for Dec. 15, 1917.

# Women Successful as Conductors\*

Have Been Quick to Learn—Average of Character and Intelligence Is High Among Those Who Apply—Public and Male Employees Have Accepted Plan Kindly

BY COL. T. S. WILLIAMS

President Brooklyn Rapid Transit Company

**O**F COURSE the employment of women for what are generally called "men's jobs" is by no means new, although it has been accentuated by the conditions which war has produced. While in some states of society women have been expected to carry the burden of most of the hard physical work, the higher standards of civilization, recognizing the importance of conserving both the physical and moral influences of women on the human race, have regarded with disfavor any employment of women which subjects them to occupation not mainly domestic or intellectual.

Notwithstanding this tendency, the census of 1910 showed that in this country more than 23 per cent of females of ten years or over were engaged in gainful occupations. Out of 8,075,000 such females only 2,530,000 were engaged in domestic and personal service, 733,000 in professional service, and 593,000 in clerical service. There were 1,807,000 engaged in agriculture, and nearly 2,400,000 in manufacture, transportation, trade and mining.

It therefore looks as if our previous occupational standard for women was being radically modified—whether for the better or worse being a question as to which there may be radical differences of opinion. The present increasing interest in this question arises out of the recent and very sudden increase in the employment of women occasioned by the conditions of war. Especially in England and France, but all over Europe, and to a considerable extent in this country, women are taking the places of men in lines of work which have been generally regarded as distinctly mannish. England has a million women engaged in munitions work alone. They are doing agricultural work to a larger extent than ever, are running automobiles, and are engaged in the operation of railroads and other transportation properties.

With the railroads in this country the employment of women, except for duties more or less clerical which they have long been performing, was at its inception a matter of necessity and not of choice. For the kinds of railroad work to which women now for the first time have been assigned, I assume all railroad companies would have continued the use of men had it been possible to obtain men with satisfactory qualifications. That was essentially our condition on the lines of the Brooklyn Rapid Transit Company, and it is with respect to our experience that I speak more particularly.

We were the first transportation company in the country to employ women as guards on subway trains. Fortunately for the trial of such an experiment, the duties of this occupation are not onerous. Train doors

are opened and closed automatically by pushing a button, and about all the woman guard has to do is to be careful in properly closing the doors, in giving the necessary train signals and in calling out the names of stations. In addition she must, of course, have a cool head, a knowledge of what to do in emergencies, and must show courtesy to passengers. We found that in nearly all these qualifications women were the equal of men, and in some surpassed men—especially the type of men now seeking these positions.

## WOMEN MAKE GOOD IN RAILWAY WORK

This initial experiment was so successful that we extended it to the position of conductors on surface cars, and to the position of porters at stations and of car cleaners. Of course, women have been successfully employed by the company as ticket agents for a great many years.

After three months' experience we are prepared to say that these women employees have absolutely made good. We have now 525 women thus employed. Of this number 300 are subway guards and 175 are surface railroad conductors. The consensus of opinion of our operating officers is that they are quicker in "breaking in" than the average man; that they are not so anxious for days off; that they attend to their duties more faithfully and have fewer accidents; that they are anxious to learn and to hold their positions; that in collecting fares and passing signals they are on an equality with the best male conductors; that they are more conscientious in registering fares, and that the rank and file of male employees are doing their best to help the women in making a success as train employees.

## REQUIREMENTS FOR POSITIONS

Female applicants for the positions must be over twenty-one years of age and preferably between twenty-four and thirty-five; must be in good physical condition, weighing not more than 150 lb.; not under 5 ft. 5 in. in height; have good eyesight and color sense, and they must present satisfactory references. The applicants are mostly women who have heretofore worked in factories, as domestic servants, as nurses, hotel employees, cashiers and school teachers. Many are wives, daughters or sisters of Brooklyn Rapid Transit men who have gone into military service, and some are widows of our former male employees. There are instances of man and wife on the cars respectively as motorman and conductor, of brother and sister, and of father and daughter.

The average of character and intelligence is high among the women already employed, and as the novelty has worn off and the public has become more accustomed to seeing women on the cars, women of more education

\*This article appeared in the *New York Evening Post* for Feb. 26 as one of a series dealing with the new industrial opportunities for women in America, brought about by the change in labor conditions resulting from the war.

are applying. The publicity which the employment of women has received has seemed to bring out applicants of a higher rather than a lower type.

Women employees are paid at exactly the same rates as the men—all of our rates being on a seniority basis. On the surface lines they start at 27 cents an hour, are raised to 30 cents an hour in the second year, with increasingly larger rates to a maximum of 35 cents an hour. As subway guard, where the work is easier, they start in at 24 cents an hour, with an increase each year to a maximum of 30 cents an hour. These wages attract the women because they are higher than they have been accustomed to receive in other occupations, and are higher, I believe, than the average amount paid women in occupations not requiring special training and experience.

Of course, the employment of women has necessitated special accommodations for their comfort at the car depots. Here they have their own rest rooms and lockers, and as the number increases special women inspectors will be employed to look out for their welfare. The women are not allowed to use the men's clubrooms, or to mingle with them in any social way during working hours.

The privileges of our group insurance plan are open to them on the same terms as to men employees of the company, and equally with the men they are entitled to free medical service.

INNOVATION SUCCESSFULLY MADE

So far as the public is concerned, it seems to have taken to this innovation kindly. It required considerable courage for the first women employees on the cars to "break the ice" and subject themselves to the curiosity of passengers. As the number of women conductors and guards increases, however, and their presence has become an old story, this cause of embarrassment is disappearing. With the exception of occasional taunts and jibes from ill-mannered men, and some ill-tempered criticism from hypercritical women, the attitude of the public towards the women employees may be said to be considerate and helpful.

It is noticeable also that their presence is having a good effect upon the male employees. The latter now appreciate the necessities which have compelled the employment of women in these occupations, and their masculine chivalry is constantly apparent. The occasional intoxicated male passenger seems to have no terror for the women conductors and guards, as they usually quiet his offensiveness by a word and a smile, and if these do not succeed there is always the motorman, to say nothing of sober male passengers, who are willing and eager to proffer their services.

Of course, there are interesting human phases of this new industrial experiment. One woman conductor fell in love with her motorman, stayed away for one day to be married and returned the next day with the announcement that both she and her husband would remain in service. One old-time motorman threw up his job because his wife would not allow him to work with a woman conductor. One woman employee fell a victim to pleurisy, and another had to give up her job because she fell off the rear platform of a car.

There have been few dismissals for inefficiency or dishonesty.

Illinois Associations Appeal to Public  
State Bodies Are Speaking to the People Through  
Newspaper Advertisements Showing the Need  
for Higher Rates

THE accompanying reproduction shows the kind of material being used by the Illinois Electric Railways Association, the Illinois State Electric Association and the Illinois State Gas Association in their united appeal to the public for due consideration of the need for increased rates. The three advertisements shown in the illustration below have been sent out for publication in the various newspapers in the State.

This campaign was decided upon in order to bring directly before the people of Illinois the problems which confront utility managers in these "high cost" times, and to cause the thinking public to realize that the vastly increased costs have affected utilities as well as other enterprises. The associations hope to point out that public utilities and railroads are per-



THREE ADVERTISEMENTS, REPRODUCED IN PART, SHOWING THE  
STYLE OF PUBLICITY EMPLOYED BY ILLINOIS  
PUBLIC SERVICE ASSOCIATIONS

haps the lone exceptions whose price to the public is fixed by ordinance or statute, thereby making them unable to increase their revenues to offset the increased costs of operation.

It is also hoped to have the public appreciate the necessity for the continued operation of public utilities on account of their intimate relation with the prosecution of the war. It is felt that if the gas and electric companies and electric railways are handicapped to such an extent that they are unable to keep their properties up to a high state of efficiency, the entire industrial world will suffer.

The following quotation from the annual report of the Comptroller of Currency, John Skelton Williams, which was noted in the ELECTRIC RAILWAY JOURNAL of Feb. 9 and is reproduced in part in one of the advertisements, is regarded as being particularly timely:

"The work of war has thrown upon many of these corporations strains which they are unable to endure without prompt help. The cost of their labor and of all materials for operation, betterment and upkeep has increased heavily and suddenly. . . . The continued and increasing efficiency of these corporations is important for the successful conduct of the war. . . . The first and most direct relief to the public utilities can be given by the state public utilities commissions and municipal and local authorities with the broad-minded co-operation of the people."

# Annual Meeting of C. E. R. A. Takes Patriotic Form

About 200 Delegates Attend—President Wilcoxon and Ex-Mayor Bookwalter of Indianapolis Speak on First Day—Work of Accountants' Association Reviewed on Friday—Special Quartet Leads Singing

THE annual meeting of the Central Electric Railway Association was held this week at the Miami Hotel, Dayton, on Feb. 28 and March 1. The first session was set for 3 o'clock on Thursday afternoon to allow delegations from neighboring cities to leave in the morning and reach Dayton the same day. The largest special party came from Indianapolis. About 200 in all were present.

C. N. Wilcoxon, president Chicago, Lake Shore & South Bend Railway and president of the association, called the meeting to order at 3 o'clock and presented his annual address, which advocated publicity as of help in securing relief to electric railways. The address was received with applause.

An attractive feature of this and the other sessions was the singing of national anthems. The singing was led by a quartet under the direction of J. F. Starkey, general passenger agent Lake Shore Electric Railway, but the audience joined in the singing.

After the presentation of the address by the president, Charles A. Bookwalter, former Mayor of the city of Indianapolis, addressed the delegates. Speaking as one who had had much to do in his official capacity with the relations between the public and the electric railways, he noted several successive changes in the attitude of the public toward electric roads. Originally when the interurban railways sought to enter terminal cities over the streets, there was a howl of disapproval. Then, as it was found that the interurban brought new business and prosperity to the cities this attitude changed to a friendly one and many roads were built. Gradually as the increase due to this impetus became less conspicuous, the popular tide turned against the railways, but it is again favorable because of a more general present appreciation of the service rendered.

Mr. Bookwalter acknowledged that in the past the public had hampered transportation development. The effect of this hostility was seen in the coal famine this year, as this famine was brought around primarily because of lack of transportation facilities rather than lack of fuel. The great benefits which electric railways can confer on the public are now becoming better recognized. In the past self-appointed guardians of the public welfare in some cities have urged that electric railways in cities should be restricted to the transportation of human beings. But this winter these restrictions have been relaxed to some extent under war conditions. The public need has affected public opinion, and the public now better realizes what electric railway service means to its welfare.

Mr. Bookwalter also discussed the war, and his address was logical and thrilling. He said that the war

was primarily due to the systematic inculcation in Germany of the doctrine ever since the Franco-Prussian War that might makes right. This philosophy has permeated the German people and entirely transformed them. We entered the war because we realized that our rights were invaded, but this invasion at home and abroad had begun in August, 1914, when the war broke out. Mr. Bookwalter strongly advocated universal military training, a sentiment which the meeting loudly applauded.

On Thursday evening all of the attendants at the meeting were the guests at a theater party of John F. Ohmer, president Ohmer Fare Register Company, Dayton.

## MEETING ON FRIDAY

The program on Friday included an address by Charles A. Gilles, Dayton, on "War Savings," a paper by A. C. Van Driesen, president Central Electric Railway Accountants, on "The Work of the Accountants' Association," and the annual report of the secretary and treasurer. The report by Mr. Neereamer and an abstract of Mr. Van Driesen's paper follow:

## REPORT OF THE SECRETARY AND TREASURER

The report of the secretary and treasurer, which was for the year ended Dec. 31, 1917, said that the present railway membership of the association consists of sixty-eight interurban lines operating 4927 miles, and two city lines. During the year there were 140 supply members. A summary of the financial report follows:

Cash on hand Jan. 1, 1917.....	\$1,644	
Receipts .....	8,352	
Disbursements .....		\$8,398
Cash on hand Dec. 31, 1917.....		1,608
Total .....	\$10,006	\$10,006

The expenses include the amount paid out by the association for the work of the committee on military efficiency and defense, *i. e.*, account of the preparation of the map, \$373, and on account of the data sheets \$144, making a total of \$517. It also includes \$737 as investments. Of this amount \$273 was stock in the Railroad Men's Building & Savings Association and \$500 was a Liberty bond. Among the receipts were an item for the sale of tariffs of the Central Electric Traffic Association, \$1,691. The report concluded with the statement:

"Notwithstanding the increased expenses of the association during the past year, our finances are now in the best condition they have been since the organization of this association, and this situation is only achieved by careful watching of each and every expense, thereby preventing waste on useless items.



"The work during the past year has been very heavy owing to the preparation of the map compiled and securing of data showing the physical condition of the interurban lines in this territory, under the auspices of the committee on military efficiency and defense. The work on the map has been completed, and the information asked for in the data sheets has been compiled so far as same has been received from the interurban companies."

## The Work of the Accountants' Association

BY A. C. VAN DRIESEN

President Central Electric Railway Accountants' Association, and  
Secretary Toledo Railways & Light Company

THE Central Electric Accounting Conference was organized in Dayton in March, 1907, "to bring together electric railway accountants for the interchange of ideas; to promote the adoption of uniform systems of accounting and to encourage more intimate personal relations." In December, 1911, at Toledo, a new constitution and by-laws were adopted, the name of the Conference changed to Central Electric Railway Accountants' Association, and the association voted to become an auxiliary of the Central Electric Railway Association. The association numbers among its members sixty-seven individuals, representing sixty-one separate and distinct electric railways, including both city and interurban lines. This is practically 90 per cent of the membership of the Central Electric Railway Association, and we trust that the remaining 10 per cent will soon be within the fold.

### SOME WORK DONE

The various agreements adopted at the first meeting in March, 1907, relative to the handling of freight and ticket accounting are still in use, merely being revised to meet changed conditions. The committee on uniform report blanks compiled in 1909 a set of blanks for the reporting of interline business, which, with few changes, are in use at the present time. The rules and blanks prepared by this committee were practically adopted as a whole by the American Electric Railway Accountants' Association at Denver, in October, 1909. Our various committees have worked hard and well in promulgating forms, decisions and recommendations to be used in accounting problems. Various accounting forms as used by the different roads are on file in the secretary's office and will be loaned to any member on request. During the early part of 1917 a clearing house for interline traffic accounts was recommended, but to the present, principally because no meetings have been held by this association, it is still in its formative state. The benefits to accrue from the installation of this system are many, principally the elimination of individual drafts with consequent saving in clerical work, besides a large saving in postage and stationery.

In 1916 the association appointed a committee on electric light and power accounting. This is a very important committee, as there is no uniform system of accounts for electric light and power throughout the country. Each state prescribes its own classification, and for an interstate road a large amount of time as well as gray matter is needed properly to report the revenue and expenses and the various statistics required, owing to the clash of different classifications.

On account of the war but one meeting was held in

1917, that on Oct. 27, for the purpose of considering the war revenue act. At this meeting certain motions were adopted relative to the collection of the taxes, and as future events have proved, the decisions then rendered by the members of this association were upheld by the Treasury Department in its interpretations of the law. Thus once again you see this association was in the forefront, as it has been so many times in the past.

It is not often that an accounting official is in the position I stand to-day, whereby he can talk directly to the operating heads and general managers of properties and tell them some of the trials and tribulations he suffers often at the hands of these very officials. Personally, I am fortunate in being able to report directly to our president and general manager, but in a large number of cases the accounting official is obliged to report through a third party, sometimes even to the operating head, which, in my humble opinion, is directly opposed to good accounting. Permit me to quote from an address given by me to embryo accountants about three years ago:

The accountant of to-day has outgrown the old bookkeeper with his debit and credit system. He must be highly trained. He should be familiar with the laws, both state and federal, governing public service corporations. Nearly all of them affect the accounting department in one way or another. He must be able to analyze; he must know his property, and by that I mean he must know every detail of the operation and organization of the property, in order that he may not only record the figures but that he may also know and understand the reasons for those figures.

In this connection I desire to emphasize the absolute necessity for the greatest co-operation between the accounting and all other departments of a corporation. In many corporations the accounting department is looked upon as a necessary evil, while in my opinion it is the very life of the organization. The secretary, who is usually the head accounting official, should report directly to the general manager or executive head of the corporation. The best results are obtained from the accounting department if it is entirely independent of other sections of the management. All other departments should act in harmony with the accounting department, and endeavor in every way possible to assist it in securing the information requested by it, as such information is necessary for the reports and other statistics used for the officials and stockholders. The accounting officer should have authority to reach directly the sources from which information for accounts is obtained and to secure it when and as asked for. The operating man should remember that a large amount of the accuracy and efficiency of the accountants' records are dependent upon the operating reports submitted by him. On the other hand, the accounting official should use all the tact possible, as sometimes the "deadly parallel," as it is called, by comparison of this year's and last year's figures, tends to make the operating head antagonistic and this in time develops into indifference. The operating men know their activities are being checked, and in many cases blame the accounting officer for the restrictions, instead of going deeper into their own departments to see where expenses can be reduced.

## Relief Urged for Boston Elevated

Governor McCall has sent a message to the Massachusetts Legislature urging that the Public Service Commission during the continuance of the war and one year thereafter, or until the Legislature shall otherwise provide, be given power to fix just, reasonable and equal rates of fare upon the Boston Elevated Railway, and to set interim rates pending a hearing on the situation. The Governor is convinced that immediate action is necessary in the interests of the public as well as the company. Under the special legislative act under which the company operates, it is restricted from charging more than a 5-cent fare.

# Report on Rapid Transit System for Detroit

The Full Text of the Report by Barclay Parsons & Klapp  
 Recommends Partnership Arrangement with D. U. R.,  
 Flexible Fare and Combined Subway and Elevated Structure

**T**HE firm of Barclay Parsons and Klapp, New York, whose first report on the transportation situation, of Detroit was made three years ago and was published in abstract in the ELECTRIC RAILWAY JOURNAL for April 3, 1915, has just presented to the Board of Street Railway Commissioners a supplementary report on a suggested rapid transit system.

The present report, which is accompanied by a number of maps and tables, was prepared in answer to the commissioners' request for a statement as to whether the growth of the city, the increased traffic and the conditions of street congestion do not now warrant the initiation of a rapid transit program. The report says that they do and recommends a combined subway and elevated railway system comprising 5.66 route-miles of subway and 21.75 route-miles of elevated railway to be operated by the Detroit United Railway. This company, the report suggests, should enter into a partnership arrangement with the city for the operation of its system within the city limits on the basis of a valuation for its present property and division of net receipts after a return has been paid on this valuation and on the new capital required for rapid transit and surface construction and extensions. After careful consideration a flexible fare is recommended.

The report says that the population of the city and suburbs is increasing at a rapid rate and the prediction is made that by 1920 there will be 1,000,000, and by 1950, 2,000,000 people. This population, with existing density of population, residential locations, and distance from points of occupation brings the city within the rapid transit class, that is, it has reached the stage where other cities have entered upon their rapid transit development. As Detroit is built on a practically level plane with no real physical obstructions to city ex-

tensions, the inevitable character of its growth must be toward residence districts of relatively low population density, houses of the one and two-family type predominating. A population, therefore, of more than 1,000,000 people distributed at about twenty per acre involves a city area of about 100 square miles or the necessity of hauling many passengers from 8 to 10 miles. This means, with ordinary electric railway service, a ride of about an hour. Table I shows actual and estimated passenger traffic from 1904 to 1950.

The report does not urge the commencement of actual subway construction in Detroit at the present time when all financial and construction resources in the country are under the strain of a great war. It points out that a considerable number of years must necessarily elapse between a decision to build and the commencement of successful operation, and that of this period much of the time must be employed in working out details of agreement, specifications and plans. This preliminary work does not involve expenditure of large amounts of money, but, when completed, would make immediate construction possible upon the resumption of normal conditions.

Table II gives the total passengers per mile of single track in Detroit, Chicago and New York, showing that the Woodward Avenue line carried in 1917 a denser traffic per mile of track than the heaviest rapid transit lines in this country with the single exception of the New York subway line in 1916. The density of traffic on Woodward Avenue is 44 per cent heavier than Halstead Street, the heaviest street car line in the city of Chicago. In fact, the reporting engineers say that so far as they have been able to ascertain there is no single line of surface cars operating over a distance of 7 or 8 miles that carries as heavy a traffic as this

TABLE I—SHOWING ACTUAL AND ESTIMATED PASSENGER TRAFFIC IN DETROIT

Year	Population	Passengers		Revenue Rides per Capita
		Total	Revenue	
1904.....		105,641,220	78,349,220	248
1910.....	500,982	194,388,505	141,690,525	282
1913.....	614,486	289,130,216	208,945,348	339
1914.....	660,000	310,010,104	219,606,056	333
1916.....	820,000	417,780,244	292,043,741	356
1917.....	914,000	440,544,836	315,498,478	361
1920.....	1,000,000	518,000,000	370,000,000	370
1930.....	1,330,000	708,000,000	507,000,000	380
1940.....	1,660,000	904,000,000	650,000,000	390
1950.....	2,000,000	1,110,000,000	800,000,000	400

TABLE II—SHOWING TOTAL PASSENGERS PER MILE SINGLE TRACK, DETROIT—CHICAGO—NEW YORK

Line	1914	1917	Per Cent Increase
Woodward .....	3,069,600	4,640,000	52.0
Michigan .....	1,737,900	2,280,000	31.1
Jefferson .....	1,716,500	2,290,000	33.4
Fort .....	1,074,000	1,400,000	30.3
Halstead Street, Chicago.....		3,230,000*	
Elevated Railways, Chicago.....	1,022,000	1,115,000*	9.2
Elevated Railways, Manhattan and Bronx, N. Y.....	3,049,800	3,230,000	6.2
Elevated Railways, Brooklyn.....		1,295,000	
Hudson and Manhattan Tubes, N. Y.	3,447,200	3,673,000	6.6
Subway, New York.....	4,468,500	4,970,000*	11.3

\*1916.

TABLE III—SHOWING RECORD OF PASSENGERS IN DETROIT JUNE 27, 1917 (AN AVERAGE DAY)

Revenue passengers, six tickets for 25 cents.....	273
Revenue passengers, seven tickets for 25 cents.....	743,660
Revenue passengers, eight tickets for 25 cents.....	65,755
Revenue passengers, Interurban tickets .....	2,283
Revenue passengers, 5-cent tickets .....	877
Revenue passengers, 5-cent cash fare each.....	51,455
Free riders (employees).....	22,720
Transfers, single .....	275,957
Transfers, double .....	62,077
Total.....	1,225,057

TABLE IV—SHOWING COMPARISON OF COST AND FIXED CHARGES ON DETROIT TRANSIT SYSTEM WITHOUT AND WITH RAPID TRANSIT

Item	System	Cost	Interest at 6 per Cent
A Present D. U. R. city surface lines and equipment .....		\$30,000,000	\$1,800,000
B Item A, with Woodward Avenue subway and elevated, and equipment..		51,000,000	3,060,000
C Item B, with an east and west subway and elevated, and equipment..		68,000,000	4,080,000
D Item C, with surface line extensions to facilitate transfers between rapid transit and surface lines.....		75,500,000	4,530,000



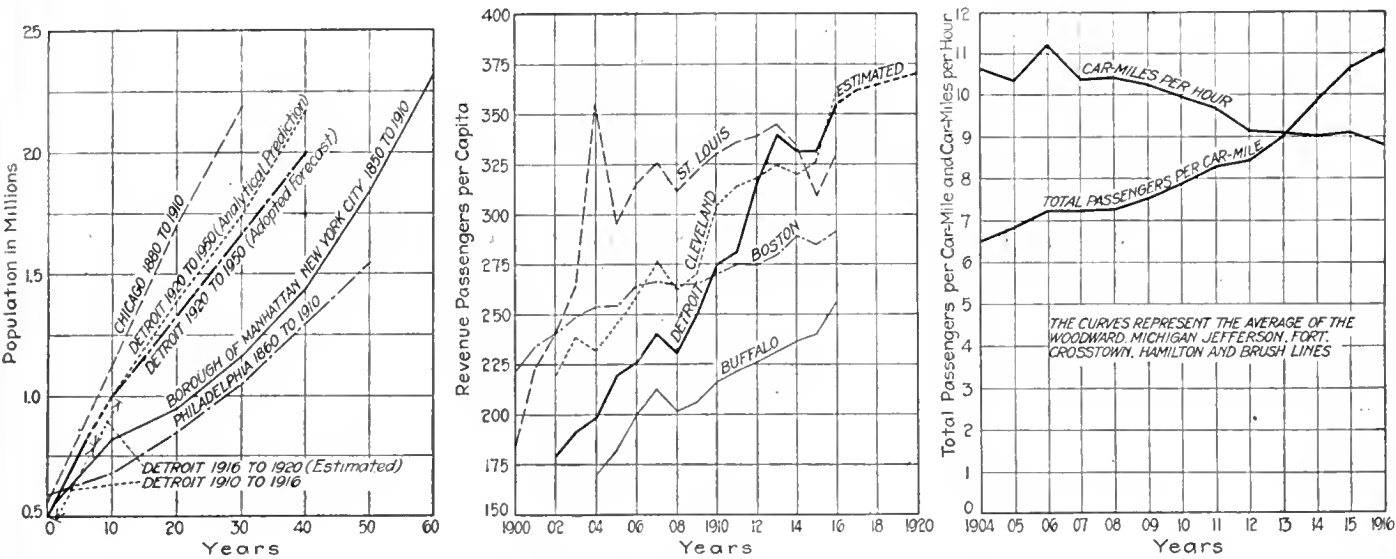


FIG. 1—PREDICTED POPULATION OF DETROIT COMPARED WITH ACTUAL GROWTH OF OTHER CITIES; FIG. 2—REVENUE RIDES PER CAPITA BY YEARS IN VARIOUS CITIES; FIG. 3—CAR-MILES PER HOUR WITH RELATION TO PASSENGERS PER CAR-MILE

Detroit line. Table III gives a record of passengers on June 27, 1907, a typical day, showing the classes with each kind of ticket.

Continuing, the report says that in the heart of the city where the congestion of vehicular and street car traffic and even pedestrian crossing traffic has become very serious, no other solution than by a subway system is possible. Outside of this congested central district overhead railways are recommended. These elevated lines for considerable part of their length, toward the downtown end, are to be built upon purchased right-of-way, using alleys and back ends of lots. Here a structure so designed as to span the right-of-way would be used, thus providing an additional vehicle highway underneath for trucks and commercial vehicles. Where the overhead structure is upon the street, a type with central columns placed between existing surface car tracks to offer the minimum obstruction to the street is recommended.

UNIFIED TRANSPORTATION SYSTEM RECOMMENDED

The report urges the unification of the surface and rapid transit systems to avoid duplication of investment in rapid transit and street car lines and maximum of

service with transfers between the two. Such a plan will encourage the use of the surface cars for short-haul local business and the rapid transit system for the long-haul passengers. A flat fare instead of the zone system is recommended, at least "within reasonable limits," and the report quotes from the decision of the Public Service Commission of Massachusetts in the Middlesex & Boston rate case in favor of a flat fare to support the decision. But the rate of fare should be made dependent upon the cost of service or else the city must be willing to pay the difference by levying taxes. Otherwise the city cannot hope to secure the necessary amount of capital for other rapid transit construction. The estimated cost of the system is given in Table IV.

Emphasis is laid upon the absolute necessity of an increase in fare over that at present in effect on the street car system of Detroit in order to support the proposed rapid transit system. The cost of a two-track elevated system of the type described would be eight times and that of the subway twenty-four times as much as the existing surface car line on the same street. The only way in which the present rate of fare has been maintained is through the constantly increasing total number of passengers per car-mile, with a

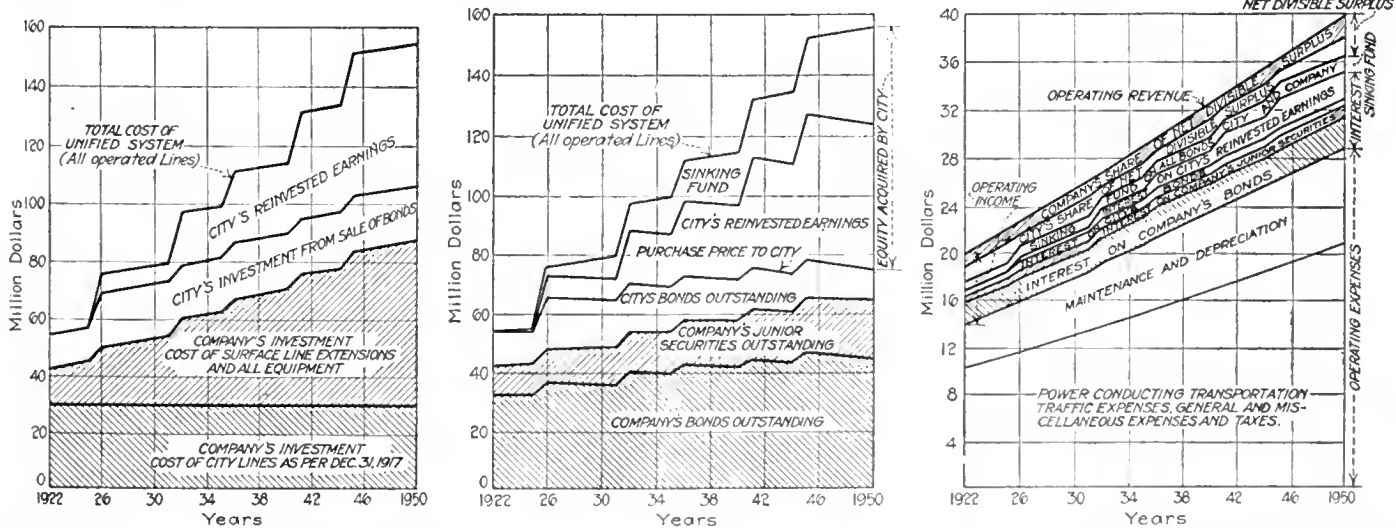


FIG. 4—DISBURSEMENTS FOR INVESTMENT IN ROAD AND EQUIPMENT, UNITED SYSTEM; FIG. 5—EQUITY IN INVESTMENT FOR ROAD AND EQUIPMENT AS AFFECTED BY THE SINKING FUND AND THE CITY'S REINVESTED EARNINGS, UNIFIED SYSTEM; FIG. 6—DISPOSITION OF OPERATING REVENUE, UNIFIED SYSTEM

## Fare Boxes Replacing Ticket Choppers on the Hudson Tunnel Lines

Convenience to Patrons Receives First Consideration  
—Forty-nine Boxes Will Be Used to Collect  
5 and 7-Cent Fares

THE Hudson & Manhattan Railroad, which operates more than 18 miles of third-rail track between New York City and points in New Jersey, through tunnels under the Hudson River, has made a study of fare collection methods for the past three years, during which time several tests on station fare boxes have been conducted. The result is that the sale of tickets is now being discontinued and all ticket boxes are being replaced with fare boxes made by the Johnson Fare Box Company.

The main consideration which has led to the adoption of the new system of fare collection has been that of convenience to the public. It is not believed by the railway company that there will be any material increase in revenue, and it is not proposed to lay off any employees. The men who have operated the ticket boxes will now operate the fare boxes and those who have sold tickets will make change.

Strange as it may seem, many people who ride every day on the subway lines of New York City prefer to stand in line and wait to buy a ticket each trip rather than invest a dollar or even 50 cents and save themselves inconvenience and delay nineteen or nine times, as the case may be. Because of this tendency in human nature and also considering the many persons who ride only occasionally and those of the poorer class who can

afford to buy only one or two tickets at a time, there is no doubt but that the waiting line at the ticket window can be reduced 50 per cent by the installation of fare boxes. The majority of the patrons, after they become familiar with the system, especially as no investment is necessary, will see to it that they have the proper change before entering the subway.

A total of forty-nine boxes are being installed, different combinations of mechanism being necessary at the various stations as the fare at some points is 5 cents while at others it is 7 cents. All boxes are operated by small motors, inclosed in the pedestal of the box. These draw current through resistors, from the third-rail circuit. The boxes stand rather high and the coins deposited pass down through a series of inclined plates onto a horizontal surface revolving endless-chain fashion. Here they lie in view of the operator and should a question arise as to the correct fare deposited, slight pressure on a small lever at the side of the fare box stops the motion of the box floor and holds the coins in sight. Otherwise the coins pass over the edge into a compartment so shaped that they fall flat against a disk revolving at an angle of approximately 45 deg. This disk has small projections so arranged that a coin is picked up and carried to the top, where it passes under a small wheel. This actuates a small pinion which engages a rack at the back of the disk directly opposite the projection. Each rack represents the denomination of the coin picked up, and records the amount on a counter at the front of the box. The projections for cents, nickels and dimes are so constructed that a coin of but one denomination will fit in a given position. A small "knock-off" hammer prevents more than one coin from passing through the recorder at once. After being recorded the coin drops down into a large container inclosed in the base of the pedestal.

The round base of the pedestal has a large revolving door in the front, the key to which is held by an employee who collects and exchanges the containers once a day. The operation of removing the container from position automatically revolves the top of the container in such a manner that by the time it is free from the pedestal, the top is closed and locked securely and the only key which will open it is held by the treasurer in the main office of the company. The container being removed from the pedestal, the revolving door is automatically locked open so that it is impossible to close it until a new container is placed in position. This is brought from the office of the treasurer with the top open, and should it become locked en route by accident, it is impossible to place it in position. Otherwise it is placed in the base of the pedestal and the revolving door closed and locked. Absentmindedness on the part of the employee is guarded against in that once the key is inserted and the revolving door opened even for the fraction of an inch the key cannot be withdrawn until the door has been opened, the container removed, a new container placed in position and the door firmly closed.

To give facility for making repairs all parts of the fare box have been made easily removable by the loosening of one or two thumb screws. The parts also have been standardized so that a damaged part can be replaced either from stock or in case of emergency from a near-by machine. The gears are packed in graphite grease in a case similar to that used to inclose the differential of an automobile.

(Concluded from page 421)

falling off in the speed on practically every line in the city, as shown in Fig. 3. It would be futile to consider an average fare on the new rapid transit system of less than 5 cents per revenue passenger, according to the engineers, even if the undertaking was financed with the city credit.

Under the proposed plan, the city will contribute the funds necessary to build the rapid transit lines, and the company will contribute the existing street car system at a reasonable valuation, which is assumed in the report to be about \$30,000,000. Subsequent rapid transit construction is to be financed by the reinvestment in the new structure of the city's share in the surplus from operation. Operation of the entire system is to be by the company under a license which is to continue until terminated by default by the company or by the purchase of the property by the city. A sinking fund to retire the bonds of both the city and the company in sixty years is provided, the equity in the property represented by the bonds retired through the operation of the sinking fund reverting to the city. The net income, after setting aside the interest charges and sinking fund, is to be divided equally between the city and the company, provided the company's income does not exceed 8 per cent on its investment.

Fig. 4 shows the disbursements for investment as divided between the city and the company, Fig. 5 illustrates the equity in the road and equipment for different years, and Fig. 6 gives the disposition of the operating revenue on the basis of the traffic assumed, all as proposed in the report.

## LETTERS TO THE EDITOR

### Should Larger Axles Be Used on Electric Railway Cars?

UNION TRACTION COMPANY OF INDIANA  
ANDERSON, IND., Feb. 23, 1918.

TO THE EDITORS:

I have read with much interest Norman Litchfield's article on axle design and manufacture. He has covered the subject quite thoroughly and has prepared a most interesting article.

However, I am wondering just what can be wrong that has required or prompted so much agitation on car-axle design and manufacturing specifications. As I read between the lines in the article by Mr. Litchfield as well as others which I have read by different authors, it seems as though a number of roads have experienced an unnecessary or possibly an undue amount of axle failure. I am happy to report that we have not experienced any trouble with axle breakage except with some extremely old axles which have possibly been in service for fifteen years. It would be almost natural to expect that axles which have been subjected to continuous vibration for this period of time would some day show fractures and possibly break off entirely.

Mr. Litchfield comments upon the increase in weight of equipment. He does not state whether or not the sizes of the axles have been increased to take care of this increased weight. There must also be taken into account the matters of track maintenance, railroad crossings, etc., and their influence upon the axle failures. I believe that track conditions on this property represent about the average prevailing condition of other properties, and we buy our axles under the American Electric Railway Engineering Association specifications.

We have never felt that we could afford to send a representative to the factory to check up the production of these axles, nor to make chemical analyses. This seems to be the practice on a number of properties, especially the large ones. The Union Traction Company of Indiana might be considered as one of the larger properties. For this reason and because, in spite of the fact that they seem to carry out to the letter the program of checking up axles and making chemical analyses of them, other properties experience so much axle failure compared to ours (which are practically *nil*) it would seem that there must be some other "bug" entering into these failures. They may be partially due to what I have previously mentioned, namely, to the use of axles of insufficient size to enable them to withstand the stresses incident to the service in which they are employed.

Mr. Litchfield's discussion of the testing of axles in service for the purpose of locating fractures interested me very much. I differ from Mr. Litchfield somewhat as to the method of testing, in so far as attempting to test the axles for failures with the wheels or gears on is concerned. I contend that this test cannot be made satisfactorily unless the axle is stripped (that is, to be perfectly safe about the matter), as in a number of cases, particularly with old axles, we have found fractures within those portions covered by the gear and

the wheel. If the wheel and the gear are left on the axle during the test such failures would escape detection and the axle might be passed as safe.

The method of procedure outlined by Mr. Litchfield, *i. e.*, dipping the axle in hot oil, wiping the surface dry and coating with whiting, is all right, only we have not found it necessary to dip the axles in hot oil.

In the issue of the *ELECTRIC RAILWAY JOURNAL* for Nov. 11, 1916, page 1025, appeared an article by the writer in which this test for defective axles is described in detail and illustrated with photographs.

R. N. HEMMING,  
Superintendent of Motive Power.

### Better Co-operation Between Railways and Technical Schools Is Desirable

PURDUE UNIVERSITY  
LAFAYETTE, IND., Feb. 20, 1918.

To the Editors:

Referring to the editorial "Line Losses Are Not All in the Line" published in your issue for Jan. 12, I feel that the ideas set forth therein relative to the subject which forms the caption of this comment are well worth further emphasis. As you point out, the average railway operating official has little time for research work beyond that which occasional emergencies make absolutely necessary. It is also quite true that the special testing equipment which forms part of the necessary laboratory apparatus of the technical school is not available to most railway men.

Aside from the purely cultural portion of its work, I take it that the technical school has two principal functions. These are to develop the engineers of the future and to push back the present frontier boundaries of human knowledge and place in usable form to those interested the results of such pioneer work. Sometimes I am inclined to think that the second-named function is first in order of importance. In the main, America's technical schools have concentrated on the first function, leaving the other to saunter along by itself. As a result our technical schools are not nearly so well linked up with our industries as were the schools of Europe before the war. As a matter of fact, the technical departments in our federal land grant colleges and state universities might in many ways with profit to themselves emulate the endeavors of their agricultural brethren who, while getting a slower start, are now going forward at battle speed. Certain it is at any rate that there is far better co-operation between our agricultural industries and our agricultural schools than there is between our technical industries and our technical schools. But the blame for existing conditions does not all fall in one place. The schools tend to be conservative and, as they are largely supported from public funds, the industries have not felt free to bring to them their problems, despite the fact that the tax returns from the industries form a very important source of these same funds. Political conditions and the suspicion which the public tends to harbor against the industries are important factors in this lack of freedom. Nevertheless, greater co-operation between the industries and schools than now exists is highly desirable and the present national situation tends to increase rather than decrease that desirability.

As far as the electric railway industry is concerned,

co-operation is possible along several lines. University extension courses might be organized for railway employees. Just at present such courses for trainmen and power-house employees might be of special value in promoting fuel conservation. Railway operating problems not of an emergency character might be made the subjects of graduate and undergraduate research work. To illustrate, such problems as the relation of fare increases and passenger traffic, effect of type of car on interchange time, rail corrugation, effect of flat wheels, and transmission line and equipment tests of a special nature all furnish possibilities along the research line. Some of the manufacturing industries have established industrial fellowships at several of the larger universities. Similar fellowships maintained under the supervision of some such body as the American Electric Railway Association might well be worth while to the railway industry.

Co-operation of the nature indicated above would be of undoubted value to all concerned. The industry, of course, would be interested in the final results and the securing of the results would tend to quicken both the students and faculties of the schools involved. Everybody knows that the railways have many problems common to the industry as a whole which are yet unsolved. If at present the universities do not have the equipment and other facilities necessary for their share of the work in solving these problems the need will be supplied provided the demand is sufficient. It is partly up to the railways to create the demand.

As most technical schools require a thesis or something equivalent in the way of research work as a prerequisite to graduation, there is no doubt considerable work of a more or less sporadic nature now being done along railway lines by the students and faculties of our technical schools. The results of such work, presented in a style suited to the reading of busy operating officials, should be of some value. Periodicals such as the *ELECTRIC RAILWAY JOURNAL*, which are widely read by railway men, would seem to be the most desirable vehicles for such presentations. An effort to secure the publication of data from such scattered sources would at least constitute a start along the line of better co-operation.

D. D. EWING,

Associate Professor of Electric Railway Engineering.

### Labor Conditions on the Brooklyn Rapid Transit

ACCORDING to a report prepared by A. Maxwell, superintendent Brooklyn Rapid Transit Company, there were practically 50 per cent more appointments as conductors, motormen, guards and "miscellaneous" during 1917 than during 1916, while the number was practically double as compared with 1915. The respective numbers were 8292, 5775 and 4218. By aggressive advertising the company has been able to maintain a correspondingly large number of applications, but it has been necessary to reduce the requirements somewhat and to employ women. The respective numbers of applications for work during the three years mentioned were 34,169, 17,263 and 14,993.

The *B. R. T. Monthly* quotes Mr. Maxwell as saying that as a result of the short experience of the company with women in train service he is pleased to record *bona fide* successful results. Their functions to date

have been limited to those of conductors, guards, car cleaners and porters, but their employment as "motormen" is still problematical. The women have proved uniformly courteous and attentive to duty, they get their fares with a minimum of trouble and inconvenience to the public, whom they seem to have "with them," and there is no doubt (the novelty of their inauguration having had full time to subside) that women have come to stay and will become a permanent institution. As to pay and seniority women employees of the company are treated on equal terms with their male colleagues.

The company has now an excused list of men on leave on account of military or naval service which includes 473 names.

## AMERICAN ASSOCIATION NEWS

### Connecticut Company Section Visits Meriden

ONE of the most successful meetings of the Connecticut Company section to date was that held at Meriden on Feb. 19. The program was of a patriotic and musical character. After opening the meeting, President W. P. Bristol turned it over to Robert P. Lee, superintendent Meriden division, who spoke briefly, and introduced successively Hon. H. G. King, Mayor of Meriden; Charles H. Tredenick, local fuel administrator; and Dr. E. C. Bradstreet of Meriden. All of these speakers referred to the untiring efforts of the management to maintain good service in the city. John J. Daly, a prominent local editor, read an original poem, "A Toast to the Flag." A number of musical selections were interspersed with the addresses.

### Varied Program of the Chicago Section

VARIETY was the characteristic feature of the meeting of the Chicago Elevated Railroads company section on Feb. 20, which was attended by about 100 members and guests. The January meeting had been abandoned on account of weather conditions.

After the singing of "America" a motion picture on accident prevention, entitled "The Reason Why," furnished by the National Safety Council, was shown. G. T. Seely followed with an explanation of the objects and accomplishments of the Electric Railway War Board. Next came a film furnished by the Ford Motor Company on "Training Officers for the National Army," and also one on "The Eleventh Regiment, I. N. G., on Its Return from Springfield."

Some stories and recitations were followed by brief talks by H. A. Johnson and coasting instructors from two of the divisions on the successful results of the use of coasting clocks. Finally, the members were entertained by a demonstration of sleight-of-hand, and the meeting adjourned in a patriotic finale with the singing of "The Star Spangled Banner."

The Trenton & Mercer County Traction Corporation, Trenton, N. J., has placed placards in its cars requesting passengers to move up to the front of the car and save delays at crossings.



## Recent Happenings in Great Britain

### Tramway Workers Ask £1 a Week Bonus—War Causes Operating Problems—Interchange of Electrical Supply Considered

(From Our Regular Correspondent)

An application for an increase of war wages of £1 a week on pre-war rates has been made on behalf of all the tramway men and tramway women workers throughout England and is now under consideration. Nearly 100 municipal and private tramway authorities are concerned, and something like 35,000 workers. The advances already granted range from 8s. to £1 a week on pre-war rates, and by the new application it is hoped by the workers to secure a uniform bonus amounting to £1 a week.

The employees of the Keighley Corporation Tramway recently asked through their union, the Amalgamated Society of Tramway & Vehicle Workers, that the advance of 15s. a week over pre-war rates granted in November last to men more than twenty-one years of age should be extended to women and youths; that Sunday labor should be paid at the rate of time and a half and all overtime paid at the rate of time and a quarter, such Sunday and overtime rates to apply to all the traffic staff. The application was refused, and the matter was referred to the committee on production, which has announced its award. Boys and youths under twenty-one are granted an advance of 7s. 6d. a week above pre-war rates, beginning on the first full pay-day in January, payable at the rate of 1s. 3d. a day or shift worked. No order is made with respect to the women, having regard to the statutory rules and orders made by the Minister of Munitions in accordance with the munitions of war (amendment) act, 1916. The committee concludes that the claim for time and a half for Sunday labor and time and a quarter for all overtime has not been established by the employees.

#### MUNICIPAL PURCHASE

The London United Tramways has deposited a Parliamentary bill which states that the undertaking is purchaseable compulsorily by the local authorities at different dates, the earliest of which is 1924. Owing to the financial difficulties of the company it is proposed to postpone the dates for purchase until 1960 or after and to repeal the whole of the enactments and agreements which compel the company to make annual payments amounting to about £4,000 a year to the local authorities for the use of the roads. The bill also purposes from the expiration of six months after the war to increase fares to 1d. a mile for ordinary passengers and a halfpenny a mile during the hours for workmen's cars. Provision is also made to enable the company, if it thinks fit, to take up and abandon certain of its lines in Kingston and part of its light railways in Uxbridge, Hayes, Southall, Norwood and Hillingdon.

War-time difficulties are responsible for several decisions which have been arrived at by the Leeds Corporation tramways committee. In the first place, in order to overcome the congestion of traffic in the center of the city, it is suggested that steps should be taken to rearrange stopping places, with a view to eliminating those which are unnecessary. As it is impossible to obtain new rails, the committee has decided to revise the tram service in order to set free sections of line which do not have to bear very heavy traffic. It is the intention of the committee to take up a single line of rails in each section in the first place, and utilize it for repairs elsewhere. Should it be necessary the other set of rails will be removed later. The committee has arrived at this decision with reluctance, but repairs are so urgently needed on some parts of the service that it feels there is no alternative. The scheme for carrying parcels on the trams, and thus relieving the transport difficulty to some extent, has been advanced a stage further, and it is hoped to begin such operation shortly. Tradesmen in the city have agreed to utilize the trams for the dispatch of parcels, and arrangements are being made to establish receiving stations in the outskirts of the city.

#### CARRYING WOUNDED SOLDIERS

Complaints were made recently by Birmingham residents that in districts where hospitals for wounded soldiers are situated civilians occasionally have to wait for a long while because the cars are filled with wounded soldiers. It was suggested that during the rush hours each day special cars might be run for the soldiers. The general manager of the tramways has replied that this is not possible, owing to the shortage of labor and materials. There has been a very heavy increase in traffic and there is a reduced number of cars. The tramways committee asked the hospital authorities to instruct the soldiers not to get on cars more than six at one time, but this has not been observed by the soldiers. In reference to a complaint respecting the removal of the covered tops of cars, the general manager stated that there was no system in vogue in the department for the taking away of any of the tops of cars. Certain tops had been removed because they were unstable and the proper material could not be obtained to put them right. In referring to the condition of the tramway track, the general manager said that the committee was faced by the shortage of materials and labor. The war conditions were such that the public had to be satisfied. The committee had not the same quantity of labor as before the war, and what it now had was not the equal in quality. Most of the pres-

ent employees were men unfit for service in the armed forces or else not acceptable on account of their age.

Negotiations have been completed between Sheffield and Rotherham for linking up the two centers by an interchange of electric supply. The expenditure involved is approximately £1,000,000. The terms provide that the cost of the cables and transformers, together with the metering arrangements estimated at £50,000, be apportioned equally between the two corporations. The cost of maintenance is to be apportioned equally and the supply is to be available for use by either corporation at such times and to such extent as may be agreed upon by the respective engineers. It is proposed to ask the government department concerned for a free grant of a portion of the cost of the linking-up arrangements. The Sheffield Corporation has been authorized to borrow £602,532 for the erection of a new electric power station at Blackburn Meadows.

#### ELECTRICAL EXTENSION

It was reported at a recent meeting of the Leeds City Council that the Ministry of Munitions, in sanctioning the purchase of a 6,000-kw. turbo-alternator by the electricity committee, recommended the consideration of a linking-up scheme between the Leeds and the Bradford electricity works. The manager of the Leeds undertaking is in communication with the city electrical engineer of Bradford on the subject. The refusal of permission for the carrying out of the main scheme for the extension of the Leeds generating station is in accordance with the Ministry's rule not to allow general developments except in connection with war work. The development was planned before the outbreak of the war. It is expected to cost upwards of £500,000. The work for which sanction is withheld for the present is the extension of the engine and boiler houses and the purchase of a 12,000-kw. turbo-generator at a cost of £300,000. The work with which the corporation will now proceed is the removal of two old engines with a capacity of 1400 kw. each and the installation of a 6000-kw. plant at an estimated cost of £35,000.

#### EDINBURGH RECEIPTS GAIN

The report of the Edinburgh & District Tramways for the year ended Dec. 31, 1917, states that the agreement between the corporation and the company for the purchase of the company's cars and plant at the expiry of the lease in 1919 has now been signed and sealed on behalf of the parties concerned. The revenue account shows that the total receipts were £375,987, an increase of £58,118 compared with the previous year. The total expenditure was £341,769, an increase of £13,299 over the previous year. The balance carried to net revenue account is £34,218, and after deducting the debit balance from previous year of £19,894, there is left a net credit balance of £14,324.

A. C. S.

# News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

## Labor Program Announced

Plan Outlined Is Designed to Secure Quick Action on Labor Troubles and Prevent Strikes

Secretary of Labor Wilson has asked Congress for appropriations of \$2,041,811 to put into operation a program of war labor administration worked out by the Council of National Defense and urged by President Wilson. The plans are designed to get quick action on labor troubles and stop them before strikes occur. For the fiscal year ending June 30 next \$485,451 is asked. The remainder is for the fiscal year 1919.

The program as set forth by the Secretary is:

A means of furnishing an adequate and stable supply of labor to war industries. This includes a system of labor exchanges, administration of training of workers, an agency for determining priorities of labor demands and agencies for dilution of skilled labor as and when needed.

Machinery which will provide for the immediate and equitable adjustment of disputes in accordance with principles to be agreed upon between labor and capital and without stoppage of work. Such machinery would deal with demands concerning wages, hours, shop conditions, etc.

Machinery for safeguarding conditions of labor in the production of war essentials. This to include industrial hygiene, safety, and also woman and child labor.

Machinery for safeguarding conditions of labor, including housing and transportation.

A fact-gathering body to assemble and present data collected through governmental agencies or independent research, to furnish information necessary for effective executive action.

Public and educational division to develop sound public sentiment, secure an exchange of information between departments of the labor administration and also promote industrial plants locally.

The personnel of the joint conference of employers and union leaders who will lay down a basis of relations between capital and labor during the war was published in the *ELECTRIC RAILWAY JOURNAL* for Feb. 23, page 381.

## Hostile Attitude Assumed

The City Council of Buffalo, N. Y., has voted to accept the recommendation of the municipal traffic commission appointed by the Mayor to start an action in the Supreme Court of Erie County to abrogate the franchise of the International Railway. The city law department is now studying the necessary pro-

cedure and the Attorney General of the State has also been asked for an opinion on the course of action that would be necessary.

The Council is allowing jitney buses to run through the city streets in violation of the law. The National League for Women's Service is operating a fleet of almost fifty jitney buses on west side streets. No fares are collected, but every passenger is asked to donate something to the league.

## MAYOR FAVORS JITNEYS

When he appeared before the war department at Washington, Mayor George S. Buck painted a picture of munition plants being forced to close down because of lack of adequate transportation and said that the only solution of the problem was the operation of large fleets of jitney buses under public ownership or by a private corporation.

In replying to an inquiry from the Council of National Defense asking for his opinion of the skip-stop plan, which is in operation on local lines of the International Railway, Mayor Buck replied: "A bad situation can be made no worse by the skip stop."

## Park Street Station Overcrowded

Downtown Subway Loop Suggested by Boston Transit Commission to Relieve Boston Congestion

The Boston Transit Commission has sent to the Legislature of Massachusetts a new plan regarding transportation facilities in Greater Boston designed to relieve congestion in the Tremont Street Subway, with special emphasis upon conditions at Park Street station.

Referring briefly to the legislative act which provided for the enlargement of the Park Street Terminal, now accomplished, the commission points out that no further enlargement of platform areas is expedient, and that the present congestion of traffic during rush hours is intolerable, due to the use of the station by too many passengers boarding cars at this point.

The only remedy, it is stated, is the distribution of traffic over a number of stations. A downtown loop is recommended, with several stations in the business district, instead of the former scheme of continuing the Boylston Street Subway to Post Office Square. The commission does not recommend a route at this time or discuss the financing of the proposed construction. Unless further extended its term of office will expire on June 30.

## M. O. Experience in Lincoln

City of 10,000 Population Reports Success with Short Road Previously Abandoned

The service on the electric railway at Lincoln, Ill., taken over by the city last summer, has been greatly improved and the patronage has been good. According to H. C. Mathein, Jr., the city clerk, a profit has been shown each month under the method of accounting prescribed by the Interstate Commerce Commission. There is still a balance in the bond fund and a considerable balance in the operating fund. The property consists of about 8 miles of road serving 10,000 people.

The election at which the matter of municipal ownership for Lincoln was decided was held on June 19, 1917. The electors decided the question by a vote of ten to one and authorized a bond issue of \$30,000 for the purchase of the line.

## VARIED PRIVATE CAREER

During its twenty-five years' existence the local railway had a varied career and changed hands many times. It was ever confronted with the problem of paving its right-of-way and for that reason its several owners contended that it was a losing proposition. The last owner had a heating franchise, but allowed his contracts for heating public buildings to lapse and in the winter of 1916 he shut down the plant, discontinuing both heating and railway service. Many attempts were made to sell the plant and railway, but no buyer could be found. After the property had been idle several months, the Lincoln Commercial Club, the merchants of the city and the city officials, after a concerted effort and campaign, convinced the people that municipal ownership was the only means of keeping the railway in operation.

The sum of \$11,500 was paid for the plant, equipment and rolling stock, much of which was little more than junk, and \$1,650 was paid the owners of the extension line for their track to the cemeteries and to Chautauqua Park.

## HOW THE ROAD IS RUN

The Mayor has assumed control of the management and operation of the system, and the auditing, accounting, etc., is done by the city clerk. Three used cars, in very good condition, were purchased, and the plant and tracks put in running condition. After about a month, it was found that the manufacture of power with the old machinery was very expensive and it was decided to dismantle and discontinue the operation of the plant. Power was purchased



## Utility Efficiency Is Vital to Nation

**President Wilson and Secretary McAdoo Express Conviction that All Steps Reasonably Possible Should Be Taken to Insure Maximum Efficiency**

Within the last few days much encouragement has been given to public utilities by government authorities. No less a person than President Wilson has formally recognized the importance of utilities in connection with the national welfare and their needs in order to secure maximum efficiency.

The progress thus far made in securing a better understanding of utility problems has been well summarized by a committee composed of P. H. Gásden, E. K. Hall and H. H. Crowell. These men were appointed to represent the American Electric Railway Association, the National Electric Light Association, the American Gas Institute and the National Commercial Gas Association in bringing to the attention of Washington authorities the critical position of utilities under war conditions. The committee feels that the outlook is decidedly more encouraging than it was two months ago, for

"In the matter of rates, the President of the United States, the Secretary of the Treasury and the Comptroller of the Currency have officially recognized that it is in the public interest that public utilities be maintained at their maximum efficiency and their rates be adjusted to meet the increased costs of doing business.

"The national government through the capital issues committee has outlined a national policy seeking to discourage unnecessary employment of money, labor and materials during the period of the war.

"The war finance bill, now on its passage, makes provision for financing the maturing obligations of public utilities and provides a method for financing necessary extensions and enlargements."

### EXPLAINING THE SITUATION

The four phases of the situation to be taken care of, as explained by the committee to the Treasury officials, are as follows:

1. Rates must be increased sufficiently to absorb the increased costs of producing the service.
2. The utilities must be relieved during the period of the war of all non-essential and unproductive requirements, such as paving, undergrounding of wires, duplication and unnecessary extension of service.
3. Some way must be found to enable the utilities to take care of obligations maturing while the war lasts.
4. Assistance must be provided to en-

able the companies to finance the unavoidable extensions of service made necessary by the nation's war program.

As a result of comments upon this situation by the Comptroller of the Currency, previously mentioned in these pages, and also as the result of additional memoranda and letters given by the committee to W. G. McAdoo, Secretary of the Treasury, the latter presented the matter to the attention of President Wilson in a letter dated Feb. 15. He enclosed the data submitted to the Treasury Department.

### SECRETARY McADOO'S LETTER

In commenting upon the inclosures Mr. McAdoo said:

"These papers indicate the existence of genuine apprehension regarding the adequacy, under present conditions, of the services and rates of local public utilities. The view is expressed that increased wages and the high cost of essential materials and supplies have affected them as they have affected everybody else, and that united effort will be necessary in order to meet alike the public requirements for service and the corporate financial needs upon which that service depends.

"As Secretary of the Treasury, I must take official notice of these matters. It is obvious that every part of our industrial and economic life should be maintained at its maximum strength in order that each may contribute in the fullest measure to the vigorous prosecution of the war. Our local public utilities must not be permitted to become weakened. The transportation of workers to and from our vital industries and the health and comfort of our citizens in their homes are dependent upon them, and the necessary power to drive many of our war industries and many other industries essential to the war is produced by them.

"It may be that here and there, because of the prominence given to less important interests immediately at hand, state and local authorities do not always appreciate the close connection between the soundness and efficiency of these local utilities and the national strength and vigor, and do not resort with sufficient promptness to the call for remedial measures. In such cases I am confident that all such state and local authorities will respond promptly to the national needs when the matter is fairly and properly brought before them.

"Our public service utilities are closely connected with and are an essential part of our preparations for and successful prosecution of the war, and the unfavorable tendencies which the accompanying papers reveal may most effectively be checked, wherever they may be found to exist, and the needed relief obtained only by prompt action on the part of the respective local authorities.

"I earnestly hope that you may feel justified in expressing the conviction that the vital part which the public utilities companies represent in the life and war-making energy of the nation ought to receive fair and just recognition by state and local authorities."

### PRESIDENT WILSON'S REPLY

On Feb. 19 President Wilson sent to Mr. McAdoo the following answer, expressing the nation's interest in the proper solution of the utility problem:

"I have examined with care the memoranda and letters which you transmitted to me with your letter of the fifteenth. I fully share the views you express regarding the importance of the public service utilities as a part of our national equipment, especially in war time. It is essential that these utilities should be maintained at their maximum efficiency and that everything reasonably possible should be done with that end in view. I hope that state and local authorities, where they have not already done so, will, when the facts are properly laid before them, respond promptly to the necessities of the situation.

"I shall be glad to have you communicate with the local authorities whenever the information in your possession suggests that such a course is desirable and in the national interest."

### UTILITY ASSOCIATIONS TO HELP

The committee has prepared two circulars, one containing its report on the situation and the other the statements by the Comptroller of the Currency, the Secretary of the Treasury and the President. These, it is said, should be distributed generally by the national utility associations among company officers and employees.

The committee recommends that the associations take steps to present this general matter to the commissions in the different states as a national question, entirely dissociated from any concrete local rate question. Until then it suggests that the associations urge their members not to submit formally to the commissions the President's and the other letters, except when immediately necessary in pending cases.

The committee also directs attention to the fact that the authorities in Washington are already overburdened with tremendous and overwhelming responsibilities, and it suggests that under the circumstances members should appeal to Washington only in cases of imperative necessity, and then only after consulting with the secretary of their own association.

### H. & M. Under U.S. Control

W. G. McAdoo, director general of the railroads, issued a formal statement on Feb. 22 explaining why the government had taken over the Hudson & Manhattan Railroad with the steam railroads. The transfer, it seems, was only part of the general scheme, as the Hudson tubes are considered a terminal property, specifically included within the President's proclamation.

(Concluded from page 426.)

from the Illinois Traction System for a period of about two and one-half months when a contract was entered into with the Lincoln Water & Light Company, a privately-owned local corporation, for power for a period of ten years at a much lower rate than it could be generated by the city itself or purchased by it elsewhere.

## Skip-Stop Order Possible

Dr. Garfield Regards It With Favor as Means for Economizing on Fuel Consumption

Dr. H. A. Garfield, Federal Fuel Administrator, expects to reach a decision shortly as to the proposed skip-stop order for the electric railways of the country. Under the proposed order, if carried out, he informed the Washington correspondent of the *ELECTRIC RAILWAY JOURNAL* this week, Dr. Garfield is convinced a considerable saving in coal will be effected.

"We have had the proposed order under consideration for some time now," Dr. Garfield said; "and it would have been put into effect before this if it were not for the fact that it will undoubtedly cause great criticism, based on misunderstanding, and, perhaps, inconvenience, to the people in large communities such as New York and Chicago, where there is much density of electric railway traffic. In smaller communities, where there is not such a great volume of traffic, there would not be such criticism and such inconvenience."

Dr. Garfield's attention was called to the fact that the people of Washington have made no complaint and have in fact welcomed changes involving skip stops, in certain sections of the capital, just put into effect, although Washington now has a volume of traffic, because of the war, considerably greater than it has ever been.

He said he was glad to know it and remarked that a readjustment of traffic conditions as to stops might be a worthy thing in many cities of the country.

"I was living in Cleveland some years ago," Dr. Garfield said, "when a skip-stop system was put into effect there, as one of the early experiments along that line, and it worked well, according to my observation. I shall have a conference with my associates, as soon as some of them who are now out of town have returned, and I will then decide as to what is to be done in this matter. There is no question in my mind that a tremendous saving in coal could be effected by such an order, and I am informed that the electric railway companies would welcome the order."

It is possible, it is believed in Washington, that a national skip-stop order may be put into effect with several exceptions or modifications in very large cities where there is very dense electric railway traffic.

## Short Industrial Line to Be Electrified

The Board of Public Improvements, St. Louis, Mo., on Feb. 19, granted a permit for the electrification in part of the Manufacturers' Railway.

At the offices of the company it was said the change would involve putting two electric locomotives in service in the central portion of the company's yards between the river and Thirteenth Street and Arsenal and Dorcus Streets in the neighborhood of the Anheuser-

Busch Brewery, which controls the railway.

The construction of the new Bevo plant, at Broadway and Pestalozzi Street, is such that it will be necessary to run loading trains into the building. Because of the smoke made by steam locomotives it was decided to substitute electrical equipment. On the remainder of the company's terminal system steam will be used. Current will be furnished from the Keokuk dam.

## Men Explain Car Situation

Invite Council and Public to Inspect Shops and Carhouse at Youngstown

The International Brotherhood of Electrical Workers Local No. 694, composed of employees of the carhouses and shops of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, recently published and paid for the following advertisement addressed to the public:

"This organization consists of the employees of the car shops and carhouses of the Mahoning & Shenango Railway & Light Company, and comprises some 200 men of all trades.

"We wish to state that on account of the continual snows and protracted cold weather for the last six weeks there have been more disabled cars in the shops and carhouses of the company than in any similar period in our knowledge and that we have been working day and night as long as our strength could stand, in the effort to keep the cars in condition to operate.

"We wish further to state that the company has to our knowledge spared neither time nor money to keep the cars moving, and we pledge our whole-hearted co-operation in restoring normal conditions as soon as possible.

"We cordially invite any member of the Youngstown City Council or any interested citizens to visit our shops at Haselton so that they may see that these statements are entirely true and correct."

## Wage Increase in Dallas

Savings on Accidents Will Be Shared With Its Men by Dallas Railway

Employees of the Dallas (Tex.) Railway have been granted an increase in wages amounting to 2 cents an hour. At the same time announcement was made of a profit-sharing plan by which employees who by vigilance are able to reduce the number of accidents may increase their earnings and share in the distribution of \$60,750, this amount being three-fourths of the annual appropriation of 4½ per cent of the company's gross receipts set aside for accidents as provided in the service-at-cost franchise. The new scale of wages is as follows: First six months, 27 cents an hour; second six months, 28 cents; two years' service, 29 cents; three years' service, 30 cents; four years' service, 31 cents; five years' service or longer, 32 cents an hour.

## Government Takes a Hand

Action in Washington, D. C., Telephone Rate Case Opens Question of Control—May Involve Other Utilities

Postmaster-General Burleson, through Washington city post-office officials, has offered to the Public Utilities Commission of the District of Columbia the opportunity to take over the control and the operation of the Chesapeake & Potomac Telephone Company in and around Washington for the period of the war, agreeing, if the offer is accepted, to maintain present standards of pay to telephone employees and guarantee to investors the present rate of return on their holdings. It is believed in Washington that the Public Utilities Commission has no power to accept such an offer, although it is understood that the President could issue an executive order making it possible for the commission to accept such an offer if he deemed it wise to do so. The offer has grown out of the application of the company, long pending, for permission to increase rates owing to increased expenses.

The Washington situation as to public utilities is of special interest because of the power which Congress has given various government departments to act as their exigencies seem to require in regard to public utilities. The Navy Department obtained from Congress some time ago legislation which gave it absolute power to enforce additional electric railway facilities at plants making naval munitions of war; the Shipping Board is now obtaining in legislation just about to pass Congress power to buy electric railway cars under an appropriation for "housing," transportation to and from homes and shipbuilding plants being considered to be part of the housing problem; and other departments are seeking to obtain similar legislation.

Secretary McAdoo of the Treasury Department is quoted as having said in private conversation within the last few days that he does not believe that the government has the right, under either the Presidential proclamation or the pending railroad bill, to take control of the electric railways of the country, but that the people of the United States are now prepared for government control and operation and that he means to open that subject soon. It may be that the plan of the Postmaster-General to bring the Washington telephone system under government control will open up the whole question of municipal ownership of public utilities in Washington.

## M. O. Conference in New York

Mayors and other officials of cities in New York State will meet on March 6 at Newburgh in annual conference. It is said that one of the matters they will consider is the subject of State-wide indorsement of the municipal ownership movement. The conference has been called by Mayor Burns of Troy. Opinion among city officials is said to favor a permissive municipal ownership bill with provision for referendum.

## Wage Demands Presented

**St. Louis Union Submits Terms Practically the Same as Those That Caused Strike—City Says Commission Cannot Raise Fare**

The organized employees of the United Railways, St. Louis, Mo., on Feb. 19 presented to the company in contract form their demands for wages, hours and improved working conditions.

The employees ask for a wage of 40 and 45 cents an hour, an increase of 54 per cent, for conductors and motormen; an eight-hour day, and time and a half for overtime. These are the same demands, as to hours and wages, as those before the recent strike, the settlement of which was noted in the *ELECTRIC RAILWAY JOURNAL* of Feb. 16, page 323. General improvement in working conditions is asked for, and grievances that cannot be settled otherwise shall be arbitrated.

A virtual "closed shop" is provided for in a section which says that the company also shall suspend an employee who has been suspended by the union and shall not reinstate him until the union raises the suspension.

The new contract is intended to supplant the strike settlement agreement made on Feb. 8 and will continue in force for one year. All its provisions date back as of Feb. 1, the day preceding the strike.

The present wage of motormen and conductors is 26 cents an hour the first year and a rising scale of 1 cent an hour each year for four years, and one-half cent an hour for four years to reach a maximum wage of 32 cents an hour. Extra men are guaranteed \$60 a month.

A time limit is fixed within which the company is to answer the demands. In the event that they are not granted an arbitration committee will be formed.

### COMPANY WANTS ORDINANCE AMENDED

T. M. Pierce and Charles A. Houts, attorneys for the United Railways, appeared before the Public Service Board on Feb. 19 to request a reduction of the tax on gross income from 3 to 2 per cent in the franchise ordinance now in the hands of the board.

The avowed purpose in seeking the reduction is to help raise funds to meet the demands of the employees for increased wages. According to a statement made by Richard McCulloch, president of the company, the increase sought would impose an additional expense of \$1,400,000 on the company, while working conditions also demanded by the men would impose a further expense of \$700,000, making an annual increase of \$2,100,000. The reduction of the tax would save the company about \$120,000 a year.

The attorneys also requested the extension of the time limit for acceptance of the ordinance by the company from nine months after its passage, as the ordinance provides, to within six months after the close of the war. They based this request upon the claim that it will be impractical, uneconomical and unpatriotic to float a bond issue for reorganization during the war. The re-

quests of the company were taken under consideration.

The Missouri Public Service Commission decided on Feb. 21 that the question of its jurisdiction in considering the appeal of the United Railways for right to increase fares must be settled before a hearing on the company's plea is given.

### CITY FIGHTS FARE INCREASE

The decision followed the objections raised by City Counselor Daues and attorneys for the company and for the city were instructed to file their briefs in Jefferson City by Feb. 25. The legal questions as to jurisdiction will be considered until March 4, when testimony

will be presented, if the commission believes it has the right to alter the company's rates.

It is Mr. Daues' contention that a constitutional provision exists in Missouri which vests in local authorities plenary power to give or withhold consent to operate electric railways; that such powers carry the right to impose conditions, and that such conditions, when accepted by the company, are binding and beyond interference by any legislative commission.

Mr. Daues is reported to have said that if the commission decides it has power to increase the 5-cent rate fixed in the present franchises of the United Railways, he will ask the commission to make a new valuation of the property. The State commission, it is said, never has made or ratified a valuation of the United Railways, but has authority to do so.

## Critical Labor Situation in Boston

**Unofficial Introduction of Accident-Negligence Bill Precipitates Unrest —Two-Cent Increase Granted Despite Existing Agreement**

A threatened strike of union employees of the Boston (Mass.) Elevated Railway has been averted by a wage increase of 2 cents an hour, despite the existing agreement effective until May 1, 1919. A strike was set for midnight on Monday, Feb. 25, but after extended conferences a mass meeting voted to postpone the strike for seventy-two hours.

After a conference lasting almost all of Wednesday, between company and union leaders and H. B. Endicott, executive manager of the Public Safety Committee, the latter recommended an increased wage of 2 cents an hour effective March 1. This was accepted for the company by its officers, and the union officials agreed to recommend acceptance by the men at a mass meeting called for Thursday night. At this meeting the men voted to accept the increase.

Mayor Peters of Boston, the Board of the Massachusetts Public Service Commission, the State Board of Conciliation and Arbitration, Governor McCall of Massachusetts, F. P. Colpoys (a federal mediator) and Secretary of Labor Wilson all sent communications urging that a strike be avoided in the interests of patriotism until all other means had been exhausted.

The unrest among the employees seems to have arisen in this way: On Feb. 14 a bill was introduced into the Massachusetts Legislature by Russell A. Sears, general attorney of the company, to place the burden of accident payments upon car-service employees who might be the cause of such accidents through negligence or carelessness. Mr. Sears, who is a director in the Liberty Mutual Insurance Company (the State insurance company organized at the time the Massachusetts workmen's compensation law was enacted), introduced this bill solely upon his own responsibility, without the company's knowledge.

Mr. Sears is deeply interested in the study of industrial accidents and their prevention, and for a long time he has been trying to create a legal stimulus to reduce industrial and other accidents. During many years of able service at the head of the company's legal department, he was not unaccustomed to introduce upon his own responsibility bills which he deemed meritorious.

The bill was seized by the union representatives as a bone of contention, and a concerted active effort was at once developed to secure a wage increase upon the pretext that the company had violated the agreement. It was asserted also that the burdens of the men had been increased and that higher wages should be granted to cover the increased cost of living since the United States entered the war. A vote to strike on Monday night was passed almost unanimously by 7000 employees on Feb. 21.

Before the Feb. 21 meeting was held, a statement emphasizing the call of the strike meeting and attacking the company over the names of the local union officials was published in the Boston dailies.

A letter was then addressed by President Brush to the union officials on the day of the scheduled meeting. This communication reviewed the relations between the company and the union officials under the agreement and outlined the various conferences held with regard to the possibility of some modification of wages, notwithstanding the agreement, through change in outside hours. The firm adherence of the company to the arbitration of all disputed matters was set forth.

To this letter the union replied on Feb. 22, claiming that its members are suffering hardships due to war prices, that many companies outside Massachusetts have voluntarily increased wages despite agreements, and that legislative relief for the company's

revenue situation is problematical. On the same day the company replied in full. In this communication President Brush again reviewed the frankness of the relations between the union and the company until the taking of the strike vote. He informed the union that the company would not support the bill which Mr. Sears had filed and that Mr. Sears himself had appeared before the committee on joint judiciary, stated that the measure was his own personal idea and asked for permission to withdraw it. The letter made a strong patriotic appeal to the men to refrain from striking.

On Feb. 25 the Public Service Commission sent to the union leaders a letter reading in part as follows:

"The commission has viewed with grave concern the possibility of a strike by the employees of the Boston Elevated Railway. The results of a tie-up of local transportation in the metropolitan district would be a serious catastrophe in time of peace, but at the present juncture the interruption of war work at the Charlestown Navy Yard, the Watertown Arsenal, the Fore River Shipbuilding Company, the Victory Plant at Squantum and a large number of private plants engaged in war work would be a national calamity. We believe that public sentiment would not approve any interruption of service, especially under present conditions, until every reasonable and honorable effort has been made by both parties to reach a peaceful adjustment of the present controversy."

## Strikers Disregard Federal Recommendation

**Twin City Ex-Employees Demand That They Be Taken Back in a Body, But Company Refuses**

Foster Hannaford, general manager Twin City Rapid Transit Company, Minneapolis, Minn., conferred on Feb. 20 with a delegation of former employees, who presented a demand that the several hundred strikers be taken back in a body. The demand was rejected.

The demand of the men arose from their peculiar interpretation of the findings of President Wilson's mediation commission. This body, as stated in the issue of Feb. 23, recommended that the former employees should offer themselves for reinstatement as rapidly as vacancies occurred. The delegation, according to a statement given out by Mr. Hannaford after the conference, insisted that the ex-employees should be taken back in a body at once and reinstated in their old positions and with the old standings. Mr. Hannaford stated, however, that since the men had left the employment of the company, the company had been forced to hire a number of men. The new men had entered the employ of the company in good faith, and the company could not fairly and honestly now discharge them to make vacancies for the strikers who were now out of employment. Mr. Hannaford also said that a number of the ex-employees had already applied for work and were now in the company's service.

## News Notes

**Philadelphia Lease Now Before P.S.C.**—At a meeting of the directors of the Philadelphia (Pa.) Rapid Transit Company on Feb. 18, the new rapid transit lease between the company and the city was ratified, and the document was signed by President Mitten and Mayor Smith. The lease has now been sent to Harrisburg for the final approval, that of the Public Service Commission.

**Toledo Came Through Safely.**—Although the Water Street power station of the Toledo Railways & Light Company, Toledo, Ohio, formed an island in a great flood that covered the low ground along the Maumee River for a week, operation was maintained almost at normal. As the water rose about the building the doors were walled up and the pumps kept the seepage below the level of the furnaces and machinery.

**M. O. Bill Killed.**—The bill to permit New York City to buy and operate public utilities has been killed following a statement by Senator Brown that "there is not enough money in treasury of New York City over and above debt limit to furnish cigarettes for the present administration during its four years in office." The legislature apparently was not willing that the city should experiment even with the Fifth Avenue Coach Company.

**Commission Appointments Confirmed.**—The Senate of New York has confirmed Governor Whitman's nomination of Thomas F. Fennell, Elmira, and Charles B. Hill, Buffalo, as members of the Public Service Commission for the Second District succeeding Commissioners Carr and Van Santvoord, respectively. Commissioner Fennell gets a two-year term and Commissioner Hill a five-year term. The chairman of the commission has not yet been designated by the Governor.

**Freight by Day in New Jersey.**—The Legislature of New Jersey has passed a bill introduced by Assemblyman James J. McAteer, Kearny, allowing electric railways operating in streets of municipalities to carry freight. The bill was passed after it had been proved that merchants and manufacturers had difficulty in receiving freight because of the congestion on the railroads. A similar bill was enacted in 1909, but this covered only the night operation of electric railways for freight purposes.

**Trenton Indictments Argued.**—Argument was concluded in the Supreme Court at Trenton, N. J., on Feb. 21 in the appeal of the officers and directors of the Trenton & Mercer County Traction Corporation from indictments found against them by the Mercer County Grand Jury at the instance of the City Commission for the illegal use

of certain streets of the City of Trenton. The officials set up thirteen assignments why the indictments should be set aside, all of them based upon the drawing of the grand jury and the alleged lack of evidence submitted.

**Increase in Wages in Des Moines.**—The Des Moines (Iowa) City Railway has announced a wage increase effective on March 1. The increase affects only motormen and conductors who have been in the employ of the company for one year and less than two years. The new scale is 33 cents whereas these men are now receiving 29 cents an hour. It is estimated that the new scale will cost the railway an additional \$1,000 a month. The increase is voluntary on the part of the company. Some time ago the union officials made an informal application for a general wage increase. They were advised that if the men would use their influence toward securing a rate advance their request would be granted if the rate increase was successful. This the men voted down.

**New Use Suggested for Hudson Tunnels.**—Governor Edge of New Jersey has written to William G. McAdoo, Federal Director-General of Railroads, suggesting the connection of the New Jersey Central, the Lehigh Valley and the Baltimore & Ohio Railroads with the Hudson & Manhattan Railroad, operating under the Hudson River, in order that thousands of New Jersey citizens living along these lines may have quicker and more convenient access to New York. In a reply on Feb. 24 Mr. McAdoo declared that the project might be feasible, now that the government had taken over the railroads. He thought that a surface connection between the terminal of the New Jersey Central and the old Pennsylvania Station in Jersey City might prove the solution. Mr. McAdoo said that the problem would be taken up as soon as other projects of a more vital nature were carried out.

## Programs of Meetings

**Arkansas Association of Public Utility Operators**

There will be a meeting of the Arkansas Association of Public Utility Operators at Hot Springs, Ark., May 21-23. Headquarters will be at the Arlington Hotel.

## Air Brake Association

The Air Brake Association will hold its annual convention May 7-10 at Cleveland, Ohio. Hotel Winton has been selected as convention headquarters. A more detailed program will be made public later, but it is announced that D. L. McBain, superintendent motive power of the New York Central Lines, and Walter V. Turner of the Westinghouse Air Brake Company will deliver addresses. The decision of the association to hold a convention was prompted by the belief that the safety features provided by the air-brake should be kept up to the highest notch in railroad transportation in war as well as peace times.



# Financial and Corporate

## Full Financing Data Required

Federal Reserve Board Committee Advises Applicants Desiring Approval for New Securities—Conference with Commissions

The capital issues committee of the Federal Reserve Board has prepared a "questionnaire" to be sent to all applicants desiring approval for new security issues. No prescribed form of application is to be required, but suggestions are made to guide applicants. All applications should be addressed to the committee, 718 Metropolitan Bank Building, Washington, D. C.

The committee suggests the following:

"If the purpose is to refund, pay or extend outstanding obligations, describe fully the character of the bonds, etc. If any war purposes are involved, reference should be made to the proper governmental authorities at Washington and elsewhere.

"If the issue is deemed necessary on account of any governmental requirement, national, state or municipal, or of any commission or public authority, describe the same in full. If the issue is deemed necessary for reasons of public health or welfare, or other public economic necessity, describe the same in full.

"In all cases full reason should be given why the proposed issues cannot be postponed until after the war or why the necessity is greater than the need of the national government in conserving the financial resources, materials and labor of the country for the war.

"It will be necessary to identify accurately the issues before a final opinion is expressed. The following information should be furnished:

### EVIDENCES OF INDEBTEDNESS

1. Name, amount, date and dates of maturity and serial number of the proposed bonds, notes or other securities.
2. Amount of total authorized issue of which proposed issue is part.
3. Attested copies of votes, ordinances or resolutions authorizing proposed issue.
4. Attested copy of mortgage, deed of trust or similar instrument under which proposed issue is made or by which it is to be secured.
5. Last balance sheet if a corporation and copy of charter and by-laws if in print.

### SHARES OF STOCK

1. Total capitalization of company.
2. Last balance sheet and copy of charter and by-laws if in print.
3. Total authorized issue of stock of which proposed issue is part.
4. Amount of proposed issue, method and dates of issue, whether by offer to shareholders, sale or public subscription.
5. Attested copies of votes authorizing proposed issues.

A conference was held on Feb. 28 between the capital issues committee and its advisory committee and representatives of the public service commis-

sions of the whole United States. This conference was indeed of especial value and interest in view of the President's letter to Secretary McAdoo (noted elsewhere in this issue), inviting him actively to promote an earnest consideration on the part of these commissions of the bearing of the exercise of their functions upon the national interests at this time. The committee presented to the commissions in a favorable manner the utility briefs and the Presidential correspondence.

The capital issues committee is interested as to whether or not, and how, it may be possible for the commissions to use their influence in postponing at this time construction and development work, even if contracted for or even though stipulated in franchises, whenever such work is not absolutely and immediately necessary for either the public welfare or the successful prosecution of the war. It must be the committee's effort, it is said, to secure the sympathetic co-operation of the commissions to reduce, as far as may be practicable, any unnecessary use of credit, saving power, material and labor.

## Toronto Net Drops

Increase in Gross Earnings for 1917 Is More Than Offset by Higher Operating Costs

While the gross earnings of the Toronto (Ont.) Railway for the calendar year 1917 showed an increase, the net earnings were adversely affected by the

in the last year to \$1,187,031, an increase of \$74,021. The passengers carried totaled 158,087,984, an increase of 8,558,230; and transfers numbered 62,301,636, an increase of 958,873.

After paying four dividends of 2 per cent each and taking in the 1916 surplus, the surplus at the end of 1917 amounted to \$5,543,683.

## Federal Finance Bill Amended

Bill for War Finance Corporation Now Specifically Covers Utilities—Early Passage Expected—Government Aid Waiting

The war finance corporation bill, it is said, will probably become a law by the end of next week. This has been amended by the insertion of the words "public utilities" to show that they are to be included in the benefits of the law. The amendment to the bill reads as follows:

Section D.: To make advances directly (1) to any corporation conducting (directly or through stock ownership) any railroad or other public utility; and (2) to any firm, corporation, or association conducting an established and going business whose operations are necessary or contributory to the prosecution of the war; provided that such advances shall be made only in such cases as the board of directors in their discretion shall determine to be of exceptional importance to the public interest. Such advances may be made for periods not exceeding five years from the passage of this act, upon such terms and upon such security and subject to such rules and regulations as may be prescribed from time to time by the board of directors of the corporation with the approval of the Secretary of the Treasury. The corporation shall have and retain power to require additional security from time to time.

It is pointed out in Washington that this amendment allows the public utility company to deal directly with the war finance corporation and obviates the doing of business with bankers. This is regarded as an advantage, in

INCOME STATEMENT OF TORONTO (ONT.) RAILWAY

	1917		1916	
	Amount	Per Cent	Amount	Per Cent
Gross earnings .....	\$6,291,759	100.0	\$5,973,161	100.0
Operating expenses .....	3,815,278	60.7	3,350,658	56.1
Net earnings .....	\$2,476,481	39.3	\$2,622,503	43.9
Interest on bonds .....	\$146,888	2.3	\$156,122	2.6
Percentage on earnings .....	970,512	15.4	909,881	15.2
Payments, taxes .....	264,271	4.2	215,707	3.6
Total .....	\$1,381,671	21.9	\$1,281,710	21.4
Surplus earnings .....	\$1,094,810	17.4	\$1,340,793	22.5

increase in wages and the material increases in the prices of supplies owing to the abnormal war conditions. The company's income statement for 1916 and 1917 is shown in the accompanying table.

The passenger earnings in the last year showed an increase of \$321,057 or 5.4 per cent, the totals being \$5,881,505 for 1916 and \$6,202,562 for 1917. The gross earnings gained \$318,598 or 5.3 per cent. The operating expenses, however, rose \$464,629 or 13.08 per cent. As a result the net earnings declined \$146,022 or 5.5 per cent. The operating ratio was 61.5 per cent in 1917 as compared to 57 per cent in 1916. The payments made to the city of Toronto amounted

view of the war circumstances under which all other forms of industry in the whole country are operating.

It is not yet settled whether the officials of the War Board of the American Electric Railway Association are to appear before the House ways and means committee, as they did before the Senate finance committee, nor whether other public utility representatives will be heard. Secretary McAdoo, however, has appeared before the House committee in support of the public utilities, and it will apparently not be necessary for public utility men to repeat their case before the House committee, for no one has appeared there in opposition to them.

Contrary to reports in the newspapers, no government financing of public utilities that is worth mentioning is going on in Washington, and there is not likely to be any until the war finance corporation bill is passed. The exception is in the case of additional railway equipment which may be required in Philadelphia by the Shipping Board, under its appropriation for housing. This appropriation passed Congress Feb. 26 and will be signed by the President.

There have been reports in the newspapers that the Navy Department is financing the building of a short electric railway line at Norfolk. This is categorically denied at the Navy Department. Only the Navy Department has legislation which would permit the financing of public utilities, except that just passed for the Shipping Board.

### Electric Railway Statistics

Comparison of Returns for November, 1917, With Those for 1916, Show Slump in Net Earnings

A comparison of electric railway statistics for the month of November, 1917, with figures for the corresponding month of 1916, made by the information bureau of the American Electric Railway Association, indicates that the expenses of electric railways in the United States are constantly increasing faster than the revenues.

Data for November, representing 7370 miles of line of companies scattered throughout the country, figured on the per mile of line basis, show an increase in operating revenues of 5.62 per cent, an increase in operating expenses of 14.30 per cent, and a decrease in net earnings of 9.17 per cent. Data representing approximately 75 per cent of this mileage indicate an increase in the amount of taxes paid of 9.84 per

cent and a decrease in operating income of 16.60 per cent.

The returns from the city and inter-urban electric railway companies, as shown in detail in the accompanying table, have been classified according to the following geographical grouping: Eastern District—East of the Mississippi River and north of the Ohio River. Southern District—South of the Ohio River and east of the Mississippi River. Western District—West of the Mississippi River.

Of the three groups shown, returns for the Eastern, representing 4759 miles of line, indicate an increase in operating revenues of 4.14 per cent, an increase in operating expenses of 12.38 per cent and a decrease in net earnings of 10.33 per cent. Taxes paid by companies represented by approximately 70 per cent of this mileage increased 9.82 per cent, while the operating income of these companies decreased 20.51 per cent.

Returns for the Southern and Western groups show that both have been affected by the rising costs of operation. The operating income of the Southern groups decreased 0.41 per cent, while that of the Western decreased 15.01 per cent. Both groups show increases in the amount of taxes paid.

The operating ratio for the country as a whole has increased from 63.01 in 1916 to 68.19 in 1917. The operating ratio of the Eastern district has increased from 63.71 in 1916 to 68.75 in 1917. The operating ratios of the South and West have also risen.

### Third Avenue Passes Income Bond Interest

The directors of the Third Avenue Railway, New York, N. Y., on Feb. 26 adopted a resolution passing the semi-annual interest due April 1 on the \$22,536,000 of 5 per cent adjustment income

bonds. The resolution stated that "there is no available surplus income of the period of six months ended Dec. 31, 1917, applicable to the payment of the interest." This statement was borne out by the income account, which showed a deficit of \$69,014 after all charges. The directors also adopted a resolution deducting \$494,386 from the company's income for the six months ended Dec. 31 to secure the proper, safe and adequate maintenance, equipment and operation of its railroad and other properties and to preserve its earning capacity. No part of the money is to be used for construction or the purchase of additional lines.

### B. R. T. Defers Dividend Vote

Quarterly Dividend Was Earned, But Company Is Waiting Until Question of Maturing Note Issue Is Settled

The board of directors of the Brooklyn (N. Y.) Rapid Transit Company on Feb. 25 voted to defer for the present consideration of the April 1 dividend. It is customary to declare this dividend at the February meeting.

President Williams said that the net profits justified the usual dividend. It is felt, however, that pending the consummation of negotiations relative to the \$57,735,000 of notes issued for rapid transit purposes and maturing on July 1 next, it would be wise not to take action on the current dividend.

The question of the maturity of the notes has been taken up with the federal authorities, and it is understood a decision has been reached that taking care of the notes is not incompatible with the interests of the government. A definite decision as to ways and means has not been reached. Officials of the company declined to comment on the probable issue of preferred stock for the purpose of providing for the maturity of the notes.

COMPARISON OF REVENUES AND EXPENSES OF ELECTRIC RAILWAYS IN NOVEMBER, 1917 AND 1916

Account	United States				Eastern District				Southern District				Western District			
	Per Mile of Line				Per Mile of Line				Per Mile of Line				Per Mile of Line			
	Amount, November, 1917	1917	1916	Increase Over 1916, per Cent	Amount, November, 1917	1917	1916	Increase Over 1916, per Cent	Amount, November, 1917	1917	1916	Increase Over 1916, per Cent	Amount, November, 1917	1917	1916	Increase Over 1916, per Cent
Operating revenues	\$13,993,085	\$1,899	\$1,798	5.62	\$8,986,304	\$1,888	\$1,813	4.14	\$1,098,078	\$1,293	\$1,274	1.49	\$3,908,703	\$2,219	\$2,002	10.84
Operating expenses	9,540,820	1,295	1,133	14.30	6,175,157	1,208	1,155	12.38	653,137	769	740	3.92	2,712,526	1,510	1,253	22.91
Net earnings	4,452,265	604	665	19.17	2,811,147	590	658	10.33	444,941	524	534	11.87	1,196,177	679	749	19.35
Operating ratio, per cent	1917, 68.19; 1916, 63.01				1917, 68.75; 1916, 63.71				1917, 59.47; 1916, 58.08				1917, 69.40; 1916, 62.59			
Av. No. of miles of line represented	1917, 7,370; 1916, 7,264				1917, 4,759; 1916, 4,726				1917, 849; 1916, 804				1917, 1,762; 1916, 1,734			

COMPANIES REPORTING TAXES

Operating revenues	\$10,377,261	\$1,836	\$1,734	5.88	\$6,047,557	\$1,713	\$1,658	3.32	\$779,462	\$1,462	\$1,354	7.98	\$3,550,242	\$2,233	\$2,034	9.78
Operating expenses	7,318,454	1,295	1,124	15.21	4,392,618	1,245	1,112	11.96	451,976	848	750	12.17	2,473,860	1,556	1,274	22.14
Net earnings	3,058,807	541	610	11.31	1,654,939	468	546	14.29	327,486	614	598	2.68	1,076,382	677	760	10.92
Taxes	755,849	134	122	9.84	435,512	123	112	9.82	71,599	134	116	15.52	248,738	156	147	6.12
Operating income	2,302,958	407	488	16.60	1,219,427	345	434	20.51	255,887	480	482	10.41	827,644	521	613	15.01
Operating ratio, per cent	1917, 70.53; 1916, 61.82				1917, 72.68; 1916, 67.07				1917, 58.00; 1916, 55.83				1917, 69.68; 1916, 62.63			
Av. No. of miles of line represented	1917, 5,652; 1916, 5,593				1917, 3,529; 1916, 3,496				1917, 533; 1916, 533				1917, 1,590; 1916, 15,64			

+Decrease.



Financial  
News Notes

**Dividend Action Put Over.**—Holders of the 5 per cent cumulative preferred stock of the British Columbia Electric Railway, Vancouver, B. C., will not receive their interim dividend as usual this year as the directors have decided to postpone consideration of it until the end of the financial year in June.

**Protective Committee for Unsecured Notes.**—Owing to the receivership of the Bay State Street Railway, Boston, Mass., the holders of unsecured notes have been asked to deposit the securities at once with the First National Bank, Boston. This applies to either serial debenture notes or notes given to banks and other institutions.

**Oakland Plan Being Distributed.**—Copies of the reorganization plan for the Oakland, Antioch & Eastern Railway, Oakland, Cal., are now being distributed to security holders with the request for prompt assent and deposit of holdings with the Union Trust Company of San Francisco. The plan was outlined in the ELECTRIC RAILWAY JOURNAL of Jan. 12.

**R. T. Sullivan a Republic Director.**—R. T. Sullivan, general manager of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, has been elected a director of the Republic Railway & Light Company, which controls the utility property at Youngstown. The membership of the board has been cut from twelve to nine.

**Another Line to Be Sold.**—Herbert Bucklen, South Bend, Ind., receiver for the St. Joseph Valley Railway, has received an order from the Circuit Court of St. Joseph County to advertise the road for sale on March 20 at Elkhart, Ind., to the highest bidder. The road will first be offered as a going concern. If not sold that way it will be offered in parcels. The ties, rails and rolling stock will even be junked if necessary.

**Havana Bonds Listed.**—The New York Stock Exchange has listed \$455,000 of general mortgage 5 per cent sinking fund bonds, series A, of the Havana Electric Railway, Light & Power Company, Havana, Cuba. Moreover, authority is granted to add to the list on or before July 1, 1918, \$763,000 of the bonds on official notice of sale. The total then listed will be \$6,660,000.

**Offering of Manhattan Second Fours.**—Hambleton & Company, New York, are offering at 73 and interest to yield 5½ per cent, a block of second mortgage 4 per cent gold bonds of the Manhattan Railway, the elevated division of the Interborough Rapid Transit Company. The bonds are due in 2013. The total authorized is \$5,409,000 and bonds aggregating \$4,523,000 are outstanding.

**Annual Meeting of Texas Line.**—The annual meeting of the stockholders of the Texas Electric Railway, Dallas, Tex., was held on Jan. 29, at which annual reports of officers were submitted and officers and directors were elected. The net income of the company for 1917 amounted to \$515,848; gross earnings from operation, \$2,138,268; operating expenses, including taxes, \$1,147,631; net earnings from operation, \$990,636; interest on bonds, debentures and floating debt, \$474,788. J. F. Strickland, president, reported that business is good.

**Wants to Sell Long-Term Bonds.**—The Tidewater Southern Railway, which operates a railroad from Stockton, Cal., to Merced and Turlock, has filed with the California Railroad Commission an application for authority to sell \$500,000 first mortgage 5 per cent thirty-year gold bonds, at a price sufficient to yield the company 80 per cent of par. The company wants the money to complete its main line from Stockton to Turlock and Hilmar, to build a branch line from its main line at Small to Manteca, and to make an extension from Hilmar to Stevenson.

**Fort Wayne Notes to Be Paid.**—It is stated that payment of all amounts due will be made on March 4 at the Central Trust Company, New York, by George C. Holt, special master, to the holders of Fort Wayne & Northern Indiana Traction Company's 6 per cent

five-year collateral gold notes, on the presentation for cancellation of notes, coupons or claims for interest. The sale of \$1,941,000 of first and refunding 5 per cent bonds, pledged as security for \$1,146,000 of the notes, was recently held in New York, as announced in the issue of Jan. 19.

**Railway Wins Tax Case.**—The city of Springfield, Ill., has lost its case against the Springfield Consolidated Railway for money claimed to be due under the pole tax ordinance. The Illinois Supreme Court has denied the motion of attorneys for the city to have the case reviewed on a petition for certiorari. The original suit was filed by the city in the Sangamon County Circuit Court in 1915, and judgment was entered for \$1,720. The case was taken into the Appellate Court of the Third District, where the judgment of the trial court was reversed on the ground that the pole rental ordinance was not passed by the city until some time after the franchise was granted to the company.

**Exchange of Bonds for Notes.**—The Eastern Power & Light Corporation, New York City, N. Y., announces that for the 5 per cent five-year convertible gold bonds of the company aggregating \$2,327,500, which fall due on March 1, it offers in exchange par for par 7 per cent collateral trust notes dated March 1, 1918, due on Sept. 1, 1918, \$2,327,500 of these notes having been authorized by the directors. The notes are to be issued under a collateral trust indenture to the Equitable Trust Company, New York, trustee, and secured by an equal amount of the maturing bonds when deposited by the present bondholders in exchange for the proposed new notes. The notes will be redeemable at par and interest at any time on thirty days' published notice. The March 1, 1918, coupons of the maturing bonds will be paid in the usual way. Satisfactory extensions of bank loans have been effected. Owing to the large additions and extensions that have been made to take care of increased business, the company has borrowed more than \$900,000 from banks. The company contemplated issuing and selling new securities to pay off both its bonds and bank loans.

Electric Railway Monthly Earnings

BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.						RHODE ISLAND COMPANY, PROVIDENCE, R. I.					
Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income	Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$58,916	*\$107,057	†\$48,141	\$14,877	†\$33,264	1m., Dec., '17	\$498,252	*\$479,060	\$19,192	\$122,381	\$102,347
1 " " '16	87,477	*57,445	30,032	27,550	†2,482	1 " " '16	481,638	*389,001	92,637	119,634	†73,003
12 " " '17	1,058,729	*1,011,991	46,738	317,907	†234,831	12 " " '17	6,000,602	*5,174,253	826,349	1,454,681	†1,128,349
12 " " '16	999,886	*814,969	184,917	316,667	†129,480	12 " " '16	5,811,996	*4,226,232	1,585,764	1,401,410	†184,354
CONNECTICUT COMPANY, NEW HAVEN, CONN.						NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.					
1m., Dec., '17	\$837,646	*\$1,121,520	†\$283,874	\$109,900	†\$173,974	1m., Dec., '17	\$45,843	*\$79,325	†\$33,482	\$8,808	†\$24,674
1 " " '16	808,198	*682,285	125,913	103,218	†22,695	1 " " '16	49,155	*55,436	†6,281	\$9,922	†11,900
12 " " '17	10,023,162	*8,415,514	1,607,648	1,208,720	†398,928	12 " " '17	555,413	*587,926	†32,513	\$8,315	†108,096
12 " " '16	9,566,434	*6,976,986	2,589,448	1,182,555	†1,406,893	12 " " '16	564,653	*591,392	†26,739	\$9,314	†73,745
NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.						WESTCHESTER STREET RAILROAD, WHITE PLAINS, N. Y.					
1m., Dec., '17	\$24,376	*\$43,287	†\$18,911	\$7,982	†\$10,929	1m., Dec., '17	\$17,564	*\$69,300	†\$51,736	\$2,653	†\$43,357
1 " " '16	25,295	*24,709	586	7,987	†7,401	1 " " '16	14,763	*16,249	†1,486	2,018	†3,480
12 " " '17	394,259	*358,141	36,118	95,801	†133,619	12 " " '17	246,023	*326,073	†80,050	27,284	†106,988
12 " " '16	357,815	*295,615	62,200	95,823	†132,077	12 " " '16	225,734	*242,393	†16,659	22,032	†38,378

\*Includes taxes. †Deficit. ‡Includes non-operating income. \$Excludes interest on bonds, charged income and paid by the New York, New Haven & Hartford Railroad under guarantee; also interest on notes held by the New York, New Haven & Hartford Railroad, not credited to income of that company.

# Traffic and Transportation

## New York Passenger Traffic

**A Total of 1,900,000,000 Fares Were Collected in a Year—More Than 5,000,000 Fares a Day**

The Public Service Commission for the First District of New York in its report to the Legislature says that the electric railway strikes of 1916 in New York City had a material effect upon traffic growth during the fiscal year 1916-1917, reducing to 353 the per capita number of rides taken upon all surface railroads and rapid transit lines from 356, the total for the year previous. In the aggregate this meant less travel than was expected, as the total increase for the year was about 20,000,000 passengers, against an increase of 91,000,000 for the fiscal year 1915-1916. The reduced increase is almost entirely due to the effect of the strike, in the opinion of experts, as in all probability, had there been no strike, the growth for the year would have equaled that for 1915-1916. The loss was the greatest where strike conditions were most severe.

### PUBLIC PAYS \$94,000,000 IN FARES

The number of passenger fares collected during the year 1916-1917 was 1,918,812,226 as against 1,898,735,615 in the year previous. The daily average of rides was 5,284,417, while the amount paid to the various companies for transportation was \$94,547,916, an increase of \$1,300,000 or about 1½ per cent. The payment for street railroad transportation during the year is equivalent to \$17.19 per capita. Active passenger car-miles decreased 7,146,733 during 1916-1917 due undoubtedly to strike conditions. The thirty-six operating companies had a total trackage of 1839 miles and operated 12,583 cars, a substantial increase over the previous year.

### BILLION MARK PASSED

Within the classification of street railroads are included elevated railroads and subways as well as street surface lines. Elevated railroads and subways had a total traffic for the year of 1,058,646,596, passing the billion mark for the first time, while the street surface railroads had 860,165,630. The elevated and subway lines showed an increase of 104,502,679, while there was a net decrease of traffic upon the surface lines of 84,426,068. The largest single increase was upon the lines of the first subway, operated by the Interborough Rapid Transit Company, where the traffic total was 414,193,992 or an increase of 42,688,674 over the preceding year. Next in importance are the figures of traffic on Interborough elevated lines, where a total of 349,380,093 and an increase of 37,133,-

297 are shown. Subway and elevated lines operated by the Brooklyn company carried a total of 226,515,512 passengers, an increase of 19,417,243. The effects of the street surface railroad strike in 1916-1917 were felt most seriously in Manhattan Borough where, with 349,788,114 passengers carried on the surface cars, there was a decrease of 77,585,733 from the previous year, which had shown an increase of nearly 12,000,000 over 1915-1916.

## Would Anticipate Fare Move

**Corporation Counsel of Seattle, Wash., Wants City to Appraise Value of Railway Property**

Hugh M. Caldwell, corporation counsel, Seattle, Wash., has presented a bill to the City Council providing for the expenditure of from \$50,000 to \$100,000 to employ experts to make a valuation of the railway properties of the Puget Sound Traction, Light & Power Company. The request is made in anticipation of the company petitioning the State Public Service Commission for an order permitting an increase in the rate of fare from 5 cents to 6 cents. Officials of the company have not definitely stated that such an increase will be asked for, although the Public Service Commission in a recent order denying the company the right to employ women as conductors, announced that such a petition would receive consideration.

In transmitting a draft of the ordinance to the Council, Mr. Caldwell said in part:

"The public service commission law does not compel the company to submit its books and accounts to an investigation by the city, but only to an examination by the commission. The employment of experts by the city would, therefore, avail us nothing unless the company agreed to permit a thorough examination of its account by the city, and kept such agreement. The unprecedented action of the commission in the 4-cent ticket case of the company, in accepting the unsupported verbal statement of an official of the company that the property used in railway business was valued at \$16,000,000, may be taken as an indication of what is to be expected of the commission in the event that the company applies for, or the commission desires to grant an increase in its rates beyond the 5-cent limit."

The Council has taken no action as yet on the ordinance.

E. F. Blaine, chairman of the Public Service Commission, has advised the City Council that the valuation of the railway property of the company, undertaken several years ago, and abandoned because of a lack of funds,

is to be completed. Chairman Blaine states that while the company has made no application for an increase in fares, the commission expects that such application will be made.

## Rerouting in New Orleans

**Changes Made Conserve Coal, Eliminate Congestion and Permit More Even Headway**

Rerouting of cars of the New Orleans Railways & Light Company to conserve coal, as a war measure, became effective in the city of New Orleans, La., on Dec. 23, 1917. Because of the granting of early competitive franchises, and the building of competitive lines, wasteful and unnecessary service has long been furnished. This caused excessive consumption of coal and created congestion and delay.

New Orleans is peculiar in that it has four live operating tracks through the main street for a distance of approximately 1 mile, in addition to four long sidings, or stand tracks, used for lay-over purposes, together with loops.

It was the practice, prior to the rerouting, for practically all of the lines to use Canal Street for a considerable distance beyond the center of the city to a point known as Liberty Place, near the river. A considerable portion of this journey was made with very few passengers. Traffic checks indicate that approximately sixty-five seats were furnished to each passenger hauled. The congestion and delay occasioned by reason of this unnecessary service was tremendous.

After a careful study, it was found feasible to remove a number of lines from the Canal Street loop by reason of entering Canal by use of the outside track in the direction of traffic on Canal for a short distance. By this short loop system all passengers from lines terminating at Canal Street are landed in the center of the city, within a radius of five city blocks. Those desiring to continue in Canal to the river may do so by use of transfer and passage on any of the six heavy trunk lines, with double-truck cars and frequent headway, using Canal in both directions between Rampart and Liberty Place.

This change conserved the use of approximately 5000 tons of coal per annum, eliminated congestion and permitted a more even headway, aside from speeding up car movement, etc. The following tables show the number of cars moved in each direction through Canal during the peak, before and after the change:

TO THE RIVER			
	Before	After	Decrease
Track 1.....	111	80	31
Track 2.....	119	65	54
FROM THE RIVER			
	Before	After	Decrease
Track 1.....	111	80	31
Track 2.....	119	77	42

Several days before these changes became effective the public was notified by posters in the end windows of each

## Hearing on Increased Fares in Reading

**Company Values Its Railway Property at \$8,350,428 and Shows What a Six-Cent Fare Will Mean in 1918 as Compared With Other Years**

A five-hour hearing was held at Reading, Pa., on Feb. 8 before the Public Service Commission of Pennsylvania on the protests of several municipalities against the 6-cent fare put into effect recently by the Reading Transit & Light Company.

### HOW THE RATES WERE CHANGED

On Nov. 6 the rates were increased from 5 cents to 6 cents on all of the suburban lines of the company's system, which comprises about 200 miles of railway extending for a distance of about 15 miles west of Lebanon, Pa., to the city of Philadelphia. On Jan. 10 the rates were increased from 5 cents to 6 cents, with a corresponding 20 per cent increase in commutation rates and other forms of transportation, in the cities of Lebanon, Reading, Norristown and Philadelphia. Protests were filed with the Public Service Commission of Pennsylvania by Lebanon, Reading and Norristown prior to the effective date. As a result, the hearing on the Reading division took place at Reading on Feb. 8. The entire day was consumed with the direct testimony of the Reading Transit & Light Company. The hearing closed without cross-examination, this being indefinitely postponed to come before another hearing, a date for which has not been set.

### VALUATION PREPARED WITH GREAT CARE

The company submitted a valuation of its physical property based on average prices for the last five years, and also on the average prices for 1917. The company considers the law at present to be based on the court decision in the Ohio Valley Water case, rendered on Oct. 8, and appealed to the Supreme Court by the Public Service Commission, which decision states that a valuation should be based on the value of the property at the time the rates are questioned. The five-year average figures were submitted for the information of the commission. The 1917 valuation indicated an increase of approximately 31½ per cent over the valuation based on the average prices for the last five years.

The earnings and expenses of the company for the five-year period were submitted as evidence, together with the estimated earnings and expenses for 1918. The increase in earnings,

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car. The daily newspapers made comprehensive announcement of the change, and in order to avoid annoyance and possible confusion, supervisors were located at the prominent street corners for the purpose of properly directing passengers unfamiliar with the change. The patrons of the company have taken kindly to the new system, which appears to have received the approval of the general public.

due to the increase in rates, less the revenues which would be discouraged by the higher rates, was assumed to be 10 per cent over 1917. The operating expenses were based on actual figures for January, together with specific increase in various items. The net results of operation for 1918 were shown to be slightly less than those for 1917.

The valuation was prepared with the greatest of care. It consisted of a complete inventory of the company's physical property, and all prices were taken from actual prices paid for materials and labor during the last five years. The costs of bridges, buildings, real estate, special track work, etc., were based on actual quotations from manufacturers, or bids for replacement by some of the best steel bridge companies in the country. The prices of cars were based on actual prices paid or on prices obtained from the manu-

facturer who built the cars. The quotations and contractors' bids were all based on average prices for the last five years and for the year 1917.

As one of the local newspapers put it, the company "told everything and denied nothing." It showed what it costs to operate the system; what is done with the fares collected and what a 6-cent fare during 1918 would mean in dollars and cents compared with the revenues of other years.

It was brought out that the present value of the railway property in service in Reading and its suburbs is \$8,350,428. This is the reproduction cost at normal 1917 prices, after allowing for depreciation. The estimated income for 1918 with 6-cent fare and allowance for depreciation, gives a net return on the above valuation of \$75,451, or nine-tenths of 1 per cent. The present value of the property, being its reproduction cost at average prices prevailing for five years ending with 1917, was found to be \$6,344,175, with a net return, after deducting depreciation, of \$135,451, or 2.12 per cent.

## Lincoln Emergency Petition Denied

**Railway Commission of Nebraska Rules Against Emergency Measure, but Will Consider Permanent Appeal**

The amended application of the Lincoln (Neb.) Street Railway for emergency rates has been denied by the State Railway Commission, and the original application of the company for a permanent increase in fares is set for hearing before the commission on March 4. In an amended petition filed with the commission the company had alleged that the company's inability to pay operating expenses, interest and 6 per cent dividends upon its preferred stock, constituted an emergency that should be provided for immediately.

### THE COMMISSION'S CONCLUSION

In concluding its opinion in the case the commission said in part:

"If a failure to pay dividends on the preferred stock because not earned during the period constituted an emergency, we should have the following results: Net surplus, \$109,011; dividends at 6 per cent on the preferred stock, \$110,587, leaving a deficit of \$1,575.

"Before the commission would declare an emergency and make a temporary rate to take care of a shortage of \$1,575, as a result of nineteen months' operation, it certainly would make an investigation as to the surplus balances created and in possession of the company prior to the period under consideration. Here we find that there is a surplus of approximately \$159,000 and this should be available for dividends on the preferred stock; but this surplus has been invested in more properties and is not available as ready cash for that purpose.

"From a further analysis, however, we find that the first five months of 1917 cut the surplus that accumulated during the last seven months of 1916, \$4,451, and the last seven months of

1917 made another cut of \$21,303, making a total deficit for the year of \$25,755. This would indicate that if the surplus of \$159,000, above referred to, were available cash it would soon be depleted.

"It is apparent that if the operating ratio developed during 1917 is to continue, a greater operating income must come from some source. The evidence is not before the commission to enable it to say what portion of such increase should come from the heating plant, the light and power plant, or from the transportation plant. The commission will have to have full and complete information as to the relation between these several plants, including all operating revenues severally, and the disbursements of the same; information of the allocations of the physical properties devoted to each particular branch of the service, and a complete allocation of the preferred stock and bonds to the several properties before it can intelligently make rates to be paid for transportation.

### PREFERRED STOCKHOLDERS REAL PARTIES IN INTEREST

"Another matter of paramount importance necessary to be considered is the relation of the preferred stock to the common stock. The outstanding preferred stock amounts to \$1,183,700; the outstanding common stock amounts to \$1,652,000. The preferred stockholders are the real parties in interest; the common stock, representing little or no property investment, directs the policies and manages the entire properties through its voting power. Through its management it has paid to itself since Sept. 1, 1912, \$198,000 in dividends and has invested in betterments and extensions \$159,000 out of the oper-

## Electric Does Its Bit

North Shore Road Out of Chicago Comes to the Aid of the Government

The unusually efficient record made by the Chicago, Milwaukee & North Shore Railroad, Highwood, Ill., during the recent severe snowstorm in the Lake region has not passed unnoticed by the daily press. The Evanston Index said:

"The day before the first storm broke in all its fury the electric line delivered ninety cars of coal to the Great Lakes naval training station. But for the timely assistance of the electric line the great training camp with its 20,000 jacksies would have suffered for lack of fuel.

"From the Borden Condensed Milk Company at Evanston the railroad received two carloads of milk, which were distributed in the towns along the line, thus averting a serious milk famine.

"When the naval station was threatened with a bread shortage in the midst of the storm an electric train crew, under tremendous difficulties, pulled a carload of bread from Libertyville to Great Lakes.

"So successful was the electric road in getting meat cars through and averting a meat shortage in a number of towns that Armour & Company have taken advantage of the facilities and shipped several more carloads of meat from their Evanston branch to supply all north shore towns along the electric line.

### ELECTRIC PROVED SUPERIOR

"In other ways the electric line proved its superiority over the steam roads during the storm. Several carloads of motor trucks were hauled from Kenosha to Milwaukee through the snowdrifts when the steam roads could not handle them. The road has made many new friends, who have found that under its present management it is really the 'road of service.'"

## Traffic Problems in Kansas City

The Kansas City (Mo.) Railways has recently asked the Public Service Commission of Missouri to consider its proposed plan of rerouting cars. The company has also asked the commission to permit the extension of the skip-stop system to certain lines. These are two of the many matters which heretofore have been the subject of city ordinance and which are now taken up directly by the Public Service Commission. This course is apparently the result of an investigation by Edward Flad, a member of the Public Service

(Concluded from page 435)

ating income. The management now finds itself unable to replace the \$159,000 into the surplus account, and is therefore unable to pay the dividends upon the preferred stock. Certainly this condition would not have arisen had the preferred stockholders (the real parties in interest) been in control of their own properties."

Commission, who was assigned to Kansas City for the purpose of helping the railway work out solutions for some of its problems.

Many of the regulatory measures affecting the company are held in abeyance temporarily because of the closer co-operation of the Public Service Commission and the railway. The City Council had, for instance, passed an ordinance requiring the railway to abolish its one-man cars. This ordinance had been signed by the Mayor, but on the request of a Council committee the matter was referred back to it. Another ordinance passed by both houses of the Council required the railway to pay the wages of the crossing patrolmen.

The Aldermen who presented the ordinance made the point that the service of the crossing patrolmen was for the benefit of the railway and that the onus of payment was therefore upon the railway. This ordinance, however, has not yet been called out for the final step to make its operation effective.

## Fare Rehearings Asked

Village of Peekskill Wants New York Commission to Reconsider Its Order of Last December

The village of Peekskill on Feb. 15 filed petitions with the Public Service Commission of the Second District of New York asking for rehearings on petitions of the Peekskill Lighting & Railroad Company and the Putnam & Westchester Traction Company for authority to increase railroad fares.

The commission in December granted the petitions of the companies and the increased fares are now in force. The village authorities ask that the proceedings be reopened and that the commission's order of Dec. 27 be suspended on the ground that the order is erroneous and unlawful.

### REASONS FOR REQUEST

1. Because a 5-cent provision in the franchises is a contract and was accepted by the Putnam & Westchester Traction Company and by the predecessor of the Peekskill Lighting & Railroad Company as a contract and was granted under Sec. 18, Article 3 of the Constitution.

2. That the evidence is insufficient to justify the conclusion that the fares heretofore charged were insufficient to yield reasonable compensation or were unjust.

3. That the part of the order providing for the cancellation of the contract as to transfers in Peekskill between the Peekskill Lighting & Railroad Company and the Putnam & Westchester Traction Company is unjust in that it results in the payment of two 7-cent fares by certain passengers.

The decision of the commission in the cases of the Peekskill Lighting & Railroad Company and the Putnam & Westchester Traction Company were referred to in the article "Some More Rays of Hope" published in the ELECTRIC RAILWAY JOURNAL of Dec. 22, 1917, page 1122.

## Full Car Signs Go

Maryland Commission Modifies Its Order With Respect to Car Capacity in Baltimore

The Public Service Commission of Maryland has passed an order making less stringent the rules that govern the loading of cars on the lines of the United Railways & Electric Company, Baltimore, Md., which operates 404 miles of electric railway. The new order does away with the full-car sign under the order adopted by the commission in the month of June, 1916, and reviewed in the ELECTRIC RAILWAY JOURNAL of June 17, 1916, page 1159.

### WHAT NEW RULES REQUIRE

Under the new rules the requirement is that in the downtown district there shall be operated in the non-rush hours in each thirty-minute period such cars as will provide 100 seats for each 100 passengers. It is provided, however, that if less than five cars of any one line pass at any point where a check is being made, then the average number of seats carried by three consecutive cars shall not be less than the aggregate number of passengers carried by these cars in the same direction.

As to the rush hours, it is required that there shall be provided 100 seats for each 100 passengers carried in any thirty-minute period, provided on lines where the average headway is three minutes or less the cars passing any point in the downtown district in any fifteen-minute period shall contain 100 seats for every 150 passengers carried during that period.

The company, however, is not permitted to carry in any car a greater maximum than that prescribed for each class of car. Under this rule the company may carry forty-seven standing passengers in a car that has seats for only fifty-two and forty-two standing in a car that has seats for forty-six and so on in proportion to the size and seating capacity of each type of car.

## Municipal Line to Reduce Fares

Councilman Erickson of the City Council of Seattle, Wash., states that within two months the fare on the city-owned railway between Third Avenue and Pine Street and Leary Avenue and Market Street in Ballard will be fixed at 3 cents.

This decision comes in spite of the fact that Seattle's municipal railway lines were operated between June 1, 1914, and Feb. 1, 1918, at a loss of about \$150,000. Within two months the city expects to receive half a dozen or more one-man cars, and they will be utilized in the equipment of the 3-cent route which measures a fraction less than 5½ miles. Councilman Erickson points out that the line between Pine Street and Market Street will relieve the congestion on the system as a whole, and that a ride for 3 cents will attract the patronage of those who now walk a dozen or more blocks rather than pay a 5-cent fare.



## Will Not Pass on Jurisdiction

Attorney General of Oregon Refuses Opinion to Commission on Question of Jurisdiction in 6-Cent Fare Case

Attorney-General Brown at Salem, Ore., recently refused to give the Public Service Commission an opinion upon the question of whether or not it had jurisdiction in the Portland Railway, Light & Power Company's 6-cent fare case. He gave as his reason the fact that the voters of Portland had enacted a charter in 1913 giving to the City Council power in the regulation of utilities. In his refusal he cited numerous authorities, upholding his contention that he, as attorney-general, should not give an opinion on a question which is involved in litigation now before the courts.

Although refusing an opinion, Attorney-General Brown said that should the courts hold that the commission had been without jurisdiction to issue its recent order granting the Portland Railway, Light & Power Company a 6-cent fare, the commission would be automatically divested of jurisdiction over most of the public utilities of the State. Cities and towns throughout the State have enacted charters with provisions similar to that in the Portland charter, and if these provisions override the commission's authority, the work of the commission for the last five years will practically be destroyed.

The Public Service Commission, through Chairman Miller, has notified the Portland Railway, Light & Power Company that the attention of the commission has been called to the fact that the company is not furnishing adequate service on its electric railway lines, and that this condition must be immediately remedied. Commissioner Miller also directed Examiner Rasch of Portland to make a survey of traffic conditions immediately and report to the commission. Chairman Miller also asked the company to furnish a comparative statement of the traffic handled as of the present time and thirty days prior.

## Electric for Steam

California Commission Recommends Electric Lines as Substitutes for Steam Railroad Service

In a report transmitted to William G. McAdoo, the Director General of Railroads at Washington, the Railroad Commission of California recommends the elimination of all unnecessary passenger service. The commission reaches the conclusion that it is "evident at once that in almost all cases where steam lines compete with electric interurban lines, the latter can as a rule render the service more satisfactorily and more economically, and are able in a number of cases to relieve the steam lines of such competing business altogether."

The commission recommended that in the case of the Los Angeles territory where the Pacific Electric Railway competes with three railroads—the Southern Pacific, the Santa Fé and the Salt Lake lines—the steam lines concerned

immediately institute a survey with the view of determining to what extent the Pacific Electric Railway can furnish the necessary passenger service, and to what extent competing steam line service could be eliminated. In this connection the commission says that authority to make such a survey and to put this recommendation into effect should be secured from the Director General of Railroads.

## One-Man Cars in Seattle

Puget Sound Company Already Has Two Cars in Operation and Is Planning to Run Twenty-three More

The Puget Sound Traction, Light & Power Company, Seattle, Wash., acting under authority granted ten months ago by the Public Service Commission to operate one-man cars wherever it seemed feasible in the city of Seattle, plans to put twenty-five new one-man cars of the Birney type in operation immediately on the close-in runs. Two of the one-man cars have already been placed in operation on the Summit line. The other twenty-three are being set up, and will be in operation in the near future. A. L. Kempster, general manager, states the company has fifteen more of the small cars on order. The cars now being put on will supplement the present service.

At a joint meeting of the franchise and judiciary committees of the City Council it was decided that the Council would not interfere with the operation of one-man cars, although resolutions had been passed directing the Mayor and the corporation counsel to resist the operation of such cars. Walter F. Meier, assistant corporation counsel, pointed out, however, that the Supreme Court has given the Public Service Commission jurisdiction over service, and that one-man cars might be argued as an improvement of service.

Operation of one-man cars on the Seattle & Rainier Valley Railway in Seattle, between Stewart and Rose Streets, is provided for in a bill recently introduced in the City Council and referred to the franchise and judiciary committees.

## N. Y. Fare Hearings Resumed

The Public Service Commission for the First District of New York on Feb. 21 resumed hearings upon the fare applications of several of the electric railways operating in New York City. These applications in most of the cases are for permission to charge 2 cents for transfers. Hearings in these cases were begun last spring, but were discontinued after a short time, first in order that various data desired by the commission might be secured and then in order that vacancies on the commission might be filled. The hearing on Feb. 21 was devoted to the presentation of new financial exhibits for the Third Avenue Railway, and adjournment was taken until Feb. 28 and March 1. The other fare cases are now scheduled to be taken up on March 11.

# Transportation News Notes

**Skip Stops in Harrisburg.**—Following a recommendation in the report by Bion J. Arnold, the Harrisburg (Pa.) Railways recently eliminated many "alley" stops on all city lines.

**Stops to Be Eliminated.**—The Trenton & Mercer County Traction Corporation, Trenton, N. J., has been authorized by the City Commission to eliminate 101 stops on the various divisions of its Trenton line.

**Receipts Jump When Jitney is Curbed.**—Enforcement of the recently enacted jitney ordinance in Dallas, Tex., has increased the daily receipts of the Dallas Railways by more than \$300 according to Richard Meriwether, general superintendent of the company.

**New Rules for Filing Tariffs.**—The Public Service Commission of Pennsylvania has issued new rules to be followed by all public service companies of the State in filing and posting tariffs and supplements to tariffs. The new rules are effective on March 15.

**Fare Increase Sustained.**—The Railroad Commission of Michigan has sustained the Houghton County Traction Company, Houghton, Mich., in the case involving the recent increase in rates by the company between Houghton and Calumet from 25 cents to 30 cents.

**Reduced Rate Tickets Discontinued.**—The Hot Springs (Ark.) Street Railway has discontinued the sale of six tickets for 25 cents and books of twenty-five tickets for \$1. These reduced rates have been in effect for several years. A straight 5-cent cash fare is now charged.

**Scranton Fare Increase to Date from March 21.**—The Scranton (Pa.) Railway has announced that on March 21 it will increase the fare unit on its lines from 5 cents to 6 cents, in accordance with a tariff filed last August. To facilitate the making of change the company will have the conductors sell strips of five tickets for 30 cents, each ticket being good for one 6-cent fare. The discussion of fares by officers of the company before the city officials of Scranton was referred to in the ELECTRIC RAILWAY JOURNAL of Feb. 16.

**Seeks Six-Cent Fare.**—The New Jersey & Pennsylvania Traction Company, operating cars between Trenton, N. J., and Lambertville, Newtown, Doylestown, Yardley and Bristol, Pa., and Lawrenceville and Princeton, N. J., has petitioned the Public Service Commission of Pennsylvania for permission to put into effect a 6-cent fare in each of its zones in that State where 5 cents is now charged. The company would make the change on March 25. The company has not made any move for an increase on its New Jersey divisions.



## Legal Notes

### CALIFORNIA.—*Car Interferes with Fire Truck.*

Where defendant's motorman knows or should know that a fire truck is coming at a great speed and runs his car out on a crossing suddenly, forcing the fire truck to swerve to the walk and injure a passer-by, the company is negligent, whether violating an ordinance or not. (King vs. San Diego Elec. Ry., 168 Pac. Rep., 131.)

### CALIFORNIA.—*Widow Has New Cause of Action.*

Code Civ. Proc. Sec. 377, providing for action for damages against a person causing death by wrongful act creates an entirely new cause of action unknown at common law. Hence, as the damage of widow for the wrongful death of her husband includes not only financial loss, but loss of consortium, the husband's execution prior to his death of a release for damages from the injury which finally resulted fatally will not bar the widow's right of action. (Early vs. Pac. Elec. Ry. Co., 167 Pac. Rep., 513.)

### ILLINOIS.—*Under Workmen's Compensation Law, Accident Must Arise Out of Employment.*

Where the head fireman of an electric company, in disregard of signs, fences and rules, entered the transformer room on no business of the company, and was there accidentally killed, compensation was not recoverable for his death, although at other times he had frequently been called upon in performing the duties of the engineer to enter the transformer room. (Northern Illinois L. & Trac. Co. vs. Industrial Board of Illinois et al., 117 N. E. Rep., 95.)

### KENTUCKY.—*Passes Given as Consideration for Right-of-Way Are Void Under Anti-Pass Law.*

Const. Sec. 196, providing that passenger transportation shall be regulated to prevent unjust discrimination, and Sec. 197, prohibiting free passes, render void as against public policy a railroad's agreement to give free transportation in return for right-of-way deeded it, especially as anti-pass law (Laws 1916, c. 1), enacted pursuant to Sec. 196, specifically prohibits transportation except for a money consideration. (Kentucky Traction & Terminal Co. v. Murray, 195 Southwestern Rep., 1119.)

### NEW JERSEY.—*Gross Receipts Include Receipts from Sale of Power.*

Acts 1906 (P. L. p. 644) requiring an annual franchise tax upon the annual gross receipts of any street railway corporation or upon such proportion of such gross receipts as the length of its line in this State upon any street, etc., bears to the length of its whole

line, was intended to impose a franchise tax upon the total of the gross receipts of such companies, including receipts from current and power sold, in accordance with its precise language, and not upon gross receipts for transportation, as was the rule under P. L. 1903, p. 232, since the act of 1906 was intended to provide a specific scheme for the taxation of street railway corporations and to differentiate such corporations from those liable to a franchise tax under the act of 1903. (Atlantic Coast Electric Railway, v. State Board of Taxes and Assessments, 101 At. Rep., 64.)

### NEW YORK.—*Review by Court of Orders of Commissions.*

Mere allegations that it may be impossible for relators to obtain the cars within the time fixed by the Public Service Commission or within a reasonable time are insufficient to justify a review of the orders of the commission by a certiorari in view of public service commissions law (Consol. Laws, Chap. 48) Sec. 22, providing that, where facts arise subsequent to the making of an order which are deemed to entitle the companies to a modification of the order which the commission has made, the companies have no standing in court until they have exhausted the remedy afforded by the statute and have given the commission opportunity to afford suitably the relief desired. (People ex rel. Brooklyn Heights R.R. Co. vs. Public Service Commission, First District, 166 N. Y. Sup., 825.)

### NORTH CAROLINA.—*Use of Street by Freight Cars Does Not Constitute Additional Servitude.*

The use by a street railway of the streets of a city under an act of the Legislature and by authority of an ordinance to transport freight cars two at a time between a railroad's freight yard and various factories within the city, thus saving the expenses of breaking bulk, and minimizing the traffic on the streets is not an "additional servitude" on the streets entitling abutting owners to additional compensation. (Turner et al. vs. North Carolina Public Service Co. et al., 93 S.E. Rep., 998.)

### PENNSYLVANIA.—*Assent to Railway Construction Must Stand.*

Township officers who have knowingly and without objection permitted a street railway to be constructed in the township cannot compel its removal. (Wilson Township vs. Easton Transit Co., 101 At. Rep., 983.)

### PENNSYLVANIA.—*Validity of a Release Executed on Sunday.*

The law will not lend its aid to enforce an executory contract made on Sunday; but the parties to a contract fully executed on that day will be left where the law finds them, and no relief given to either.

Where a release of damages for personal injury was executed and delivered and the consideration paid on Sunday, the contract was executed and binding upon the parties, and if otherwise valid, discharged the party liable. (Williams vs. Philadelphia Rapid Transit Co., 101 At. Rep., 748.)

## New Publications

**Proceedings of Electric Railway Section Meeting, Sixth Annual Safety Congress, National Safety Council.** Published by the National Safety Council, Continental & Commercial Bank Building, Chicago, Ill. Illustrated. Seventy-eight pages. Paper.

The Council has issued in pamphlet form as Part 7 of the *Proceedings* of the Sixth Annual Safety Congress, held in New York City on Sept. 13, 1917, a full account of the electric railway section meeting. An abstract of the papers and discussions appeared in the issues of the *ELECTRIC RAILWAY JOURNAL* for Sept. 15, 1917, page 445, and Sept. 29, 1917, page 579. The tables referred to in the abstract are given in full in this pamphlet. The report could be read with profit by every man connected with an electric railway who is responsible for the safety of employees or the public.

### **Eye Hazards in Industrial Occupations;**

By Gordon L. Berry, field secretary National Committee for the Prevention of Blindness, with the cooperation of Lieut. Thomas P. Bradshaw, U. S. Army, formerly technical assistant to the director of American Museum of Safety. Published by the National Committee for the Prevention of Blindness, 130 East Twenty-second Street, New York, 150 pages, illust. Price 50 cents.

In this volume the author reviews the chief industrial hazards to eyesight in the industries of the United States. Case reports illustrate each section, the special dangers are described and recommendations made for such changes of working conditions, or installations of protective devices as have been found suitable for protecting workers. The publication is most completely illustrated.

### **THE SCOPE OF THE BOOK**

The following section headings indicate the scope of the book: statistics of eye accidents; chipping operations; machine operations; abrasive wheels; sand-blasting; "mushroomed" tools; riveting radiations from intense light and heat sources; ultra-violet rays in illuminants; radiant energy in arc welding and in molten metal; metallurgical operations; glassblowers' cataract; infections; gage glasses; acids and chemicals; treatment of acid burns; industrial poisons; removal of dangerous fumes, vapors and gases; spray process hazards; methyl alcohol; bottling accidents; mining and quarrying; agricultural hazards; goggles; garment trade hazards; industrial lighting; the safety movement.

## Personal Mention

**Paul C. Fratessa** has resigned as vice-president of the Fresno (Cal.) Interurban Railway.

**James F. Kieser** has been appointed roadmaster of the Mobile Light & Railroad Company, Mobile, Ala., to succeed **L. A. Wilson**, resigned.

**William Carpender** has been elected president of the Sixth Avenue Railway, New York, N. Y., now included in the New York Railways, to succeed the late **Frank Curtiss**.

**M. E. De France**, formerly electrical superintendent of the Hot Springs (Ark.) Street Railway, is now connected with the Deming Ice & Electric Company, Deming, N. M.

**C. S. Keever**, heretofore acting superintendent of transportation of the Union Traction Company of Indiana, Anderson, Ind., has been appointed superintendent of transportation of the company.

**Ralph Boardman**, a well-known young member of the Minnesota bar, has been appointed claim attorney for the Twin City Rapid Transit Company, Minneapolis, Minn. He succeeds **John F. Dahl**, who will enter private practice after ten years of service with the railway.

**Henry W. Killeen** has become a member of the law firm of Norton, Penney & Nye. **Porton Norton**, senior member of the firm, died a short time ago, and the new firm will be known as Penney, Killeen & Nye. The firm is counsel for the International Railway, Buffalo, N. Y., and **Thomas Penney** is vice-president of the railway. Mr. Killeen was city attorney of Buffalo from 1898 to 1902. He will make a specialty of legislative matters formerly handled by Mr. Norton.

**Robert Thompson, Jr.**, superintendent of transportation of the Toledo Railways & Light Company, the Maumee Valley Railways & Light Company, and the Toledo, Ottawa Beach & Northern Railways & Light Company, Toledo, Ohio, was placed in direct charge of car operation of the above lines, effective on Feb. 8. Mr. Thompson was formerly assistant general manager of the Manhattan & Queens Traction Corporation, Long Island City, N. Y. The companies at Toledo operate more than 150 miles of electric railway.

**A. M. Ludwig**, auditor Elmira Water, Light & Railroad Company, Elmira, N. Y., has been authorized to change his name to **A. M. Lewis**. Mr. Lewis, who was born in 1884, was employed from 1909 to 1915 as accountant in charge for the receivers of the Metropolitan Street Railway, New York City. Prior to taking up his present work early in 1917, he was associated as a general accountant with the United Gas & Electric Engineering

Corporation, New York City. Mr. Lewis has also been connected with the Western Union Telegraph Company as a traveling auditor and has served on the staffs of Haskins & Sells, C.P.A.; Deloitte, Plender, Griffiths & Company, C.A., and Patterson, Teele & Dennis, C.P.A., New York City.

**W. H. Wright** has been elected secretary of Georgia Railway & Power Company, Atlanta, Ga. This office has been held by **W. H. Glenn**, who is also vice-president and operating manager of the company. On account of Mr. Glenn's numerous duties as head of the operating department, it was decided



W. H. WRIGHT

that he should be relieved of the secretary's work. Mr. Wright began work with the Georgia Railway & Electric Company, the predecessor of the Georgia Railway & Power Company, in February, 1906, as secretary to **H. M. Atkinson**, chairman of the board. Mr. Wright is also private secretary to Mr. Atkinson, and is secretary of the Georgia Railway & Electric Company.

**G. A. Strain** has been promoted from superintendent of the gas department of the Helena Light & Railway Company, Helena, Mont., to the position of general superintendent of the following properties, with headquarters at Ithaca, N. Y.: Homer & Cortland Gas Light Company, Cortland, N. Y.; Ithaca Gas & Electric Corporation, Ithaca, N. Y.; Norwich Gas & Electric Company, Norwich, N. Y.; Oneonta Light & Power Company, Oneonta, N. Y.; Standard Light, Heat & Power Company, Sidney, N. Y.; Van Wert (Ohio) Gas Light Company; Cayuga Power Corporation, Ithaca, N. Y.; Groton (N. Y.) Electric Corporation; Ovid (N. Y.) Electric Company. Mr. Strain has been associated for the last twelve years with

the operating organization of the J. G. White Management Corporation, New York City, the managers of the aforementioned companies.

**H. W. Fuller** has been appointed vice-president in charge of operation of the Northern States Power Company, with headquarters at Minneapolis, Minn. In this capacity Mr. Fuller will relieve **R. F. Pack**, vice-president and general manager, of operating responsibilities which have increased greatly due to the rapid growth of the Northern States organization. Mr. Fuller has been with **H. M. Byllesby & Company**, Chicago, Ill., who control the Northern States Power Company, for seven years, devoting a large part of his time to the solution of special operating problems. He was born in New York and received his education in the public schools of Bayonne, N. J., the State Model School of New Jersey, and Rutgers College, graduating in 1891. He entered the service of the Consolidated Traction Company, Newark, and became assistant superintendent and assistant general manager, leaving this position in 1901 to become general manager of the Washington Railway & Electric Company and the Potomac Electric Power Company.

**J. W. Andrews** has severed his connection with the International Railway, Buffalo, N. Y., to investigate transportation conditions for the pomological division of the bureau of markets of the United States Department of Agriculture. Upon leaving Syracuse University, Mr. Andrews entered the employ of the Utica & Mohawk Valley Railway, Utica, N. Y., in the power department. Subsequently, he spent three years with the Lackawanna Steel Company, Buffalo, on electrical and mechanical work. In 1908 Mr. Andrews entered the wholesale commission business in Utica and later transferred to New York City. In 1910 he became connected with the Public Service Commission for the Second District of New York as an assistant in the electric railway division. After three years with the commission, Mr. Andrews resigned and became superintendent of the Buffalo-Olcott division of the International Railway, from which position a year later he was transferred to the general office staff of the company, where he has been engaged upon various passenger and freight transportation matters.

**August K. Tegtmeier** has been appointed engineer of maintenance of way of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, under **Charles C. Beckman**, superintendent of maintenance of way. Mr. Tegtmeier was born in Conshohocken, Pa., on June 25, 1894, and was educated in the public schools of that town and Conshohocken High School, from which he was graduated in 1910. In September of the same year he entered the University of Pennsylvania, spending the vacation periods in the employ of the Atlantic City & Shore Railroad, the American Bridge Company, and the New York Central Railroad. Mr. Tegtmeier was graduated from the civil en-

gineering department of the University of Pennsylvania in June, 1914. Immediately he re-entered the employ of the New York Central at Albany, but left there in the fall of 1915 to become an engineering inspector in the department of highways in the city of Philadelphia. Six months later he returned to railway work in an engineering position in the maintenance of way department of the New York State Railways at Rochester, N. Y. He continued with that company until June, 1917, when he became connected with the forces of the Republic Railway & Light Company, controlling the Mahoning & Shenango Railway & Light Company.

William R. Davis, chief engineer of Station A of the Springfield Gas & Electric Company, Springfield, Ill., controlled by the same interests that control the Springfield Consolidated Railway, loaned to the United States government for the period of the war, is credited with a very important invention in connection with wireless telegraphy. Mr. Davis has been serving for several months as chief instructor of the naval radio service training school, Minneapolis, Minn. The story of his invention is told in a full-page illustrated article in the *Scientific American*. The device is a high-frequency generator which reproduces the exact sound of the radio dot and dash, so that men to operate buzzers can be eliminated, while an unlimited number of students can be trained at one time. The invention combines the results obtainable from a dictaphone, a high-frequency generator and a telephone. The dictaphone records the message, which may be sent at any speed, the generator reproduces the exact sound of a wireless message, while the telephone transmits the message to the student. By the generator, which gives the high-pitched drone peculiar to wireless, messages are recorded on a wax dictaphone cylinder. Once inscribed, a cylinder may be used again and again to repeat the message, which is transmitted by means of a head phone to any number of students.

## Obituary

William J. Holliday, a director in the Indianapolis Street Railway and the Belt Railroad, Indianapolis, Ind., is dead at the age of eighty-nine.

W. B. Schofield, a member of the Illinois State Civil Service Commission and formerly a member of the Illinois Public Utilities Commission, recently died of heart disease at his home in Marshall, Ill.

G. W. Hatch, general superintendent of the Piedmont Railway & Electric Company, Burlington, N. C., is dead. He succumbed to injuries received in an accident to one of the cars of the company following a recent severe snow storm.

## Construction News

Construction News Notes are classified under each heading alphabetically by States. An asterisk (\*) indicates a project not previously reported.

### Recent Incorporations

**Middlesboro (Ky.) Street Railway.**—Chartered to construct an electric railway along Cumberland Avenue and other thoroughfares of the city of Middlesboro. The line will also make connections with the Yellow Creek mines and adjacent mining towns. Mayor E. P. Helphurn, Middlesboro, is interested. [Feb. 23, '18.]

### Franchises

\***Savannah, Ga.**—The Chatham County Traction Company has received a franchise from the County Commissioners to build a line from Stiles Avenue, on the Augusta Road, to the Brampton tract of the Foundation Shipbuilding Company. H. C. Foss, manager Savannah Electric Company, is reported interested.

**Muskegon, Mich.**—The matter of granting a thirty-year franchise to the Muskegon Traction & Lighting Company will be voted on in April.

**Chillicothe, Ohio.**—The Peoria & Chillicothe Electric Railway has received a two years' extension of time on its franchise to construct a line in Chillicothe. [Feb. 9, '18.]

### Track and Roadway

**Muscle Shoals Traction Company, Florence, Ala.**—A campaign has been begun by the Chamber of Commerce of Huntsville for the raising of the necessary money for the preliminary work on the proposed electric railway of the Muscle Shoals Traction Company to connect Huntsville and Florence. Thurston Allen, Florence, secretary. [Jan. 26, '18.]

\***Alameda, Cal.**—The City of Alameda will construct and operate an electric railway over 1 mile long to serve all the north side industries from Pearl Street westward in the territory reached by a track laid on Blanding Avenue east of Park Street and on Clement Avenue west of Park Street. The money for the construction of the line will be supplied by the city's electric light plant. The road will be a single-track line for freight only and the rolling stock will consist of electric locomotives driven by power from the municipal light plant.

**Clear Lake Suspended Monorail Company, Hopland, Cal.**—It is reported that

Director General of Railroads McAdoo has consented to a permit for the construction of the Clear Lake Suspended Monorail Company's line from Hopland to Lakeport. G. L. Hardison, San Francisco, is interested. [Jan. 26, '18.]

**Pacific Electric Railway, Los Angeles, Cal.**—This company will double-track its line between Long Beach and San Pedro, about 5 miles, at a cost of about \$200,000.

**Jacksonville (Fla.) Traction Company.**—The extension of the Jacksonville Traction Company's line through Brentwood to the Florida State Fair Grounds has been completed and operation has been begun on the line.

**Atlanta, Birmingham & Atlantic Railway, Atlanta, Ga.**—A storage-battery car will be used by the Atlanta, Birmingham & Atlantic Railway for passenger service on its line between Brunswick and Thalman.

**Suburban Railroad, Chicago, Ill.**—A petition has been filed by the Suburban Railroad with the Public Utilities Commission of Illinois to sell all its corporate property and assets to the Chicago & West Towns Railway, by which it is controlled.

**Wichita-Walnut Valley Interurban Railway, Wichita, Kan.**—The Public Utilities Commission of Kansas has granted the Wichita-Walnut Valley Interurban Railway permission to issue \$1,000,000 first mortgage bonds and \$200,000 in common stock. The order of the commission grants permission to the company to acquire and own real estate for rights-of-way, terminal and station purposes and to construct and equip that portion of the line which connects Wichita, El Dorado and Augusta, about 41 miles, all in accordance with the terms of a contract dated Dec. 19, 1917, between the company and John R. Scott of St. Louis, Mo., which contract is to be secured by a bond of \$500,000, when bonds are underwritten in the amount of \$1,000,000. Charles Payne, secretary. [Jan. 5, '18.]

\***Jenkins (Ky.) Street Railway.**—The city of Jenkins plans the construction of a 7-mile electric railway in the near future. Connections will also be made with McRoberts, Fleming, Dunham and Burdine.

**Kansas City, Lees Summit, Lone Jack & Eastern Railway, Kansas City, Mo.**—It is reported that work has been begun on the construction of the proposed line of the Kansas City, Lees Summit, Lone Jack & Eastern Railway. Grading has been completed part of the way to Lee's Summit. The Kansas City terminus of the line will be about Thirty-first Street and Hardesty Avenue. The construction within the city limits will cost about \$200,000 and outside of the city \$1,000,000. W. E. Winner, Kansas City, is interested. [Nov. 3, '17.]

**Columbus, Delaware & Marion Electric Company, Columbus, Ohio.**—It has been announced that the Columbus, Delaware & Marion Electric Company plans to spend about \$1,000,000 for track and power plant improvements in Marion. It is proposed to centralize all general offices in Marion.

**\*Lorain, Ohio.**—The City Council has asked Chalmers C. Miller, city engineer, to draw up specifications showing the probable cost of a single-track railway line with two cars from the loop to the Cromwell Steel plant.

**Oregon Electric Railway, Portland, Ore.**—The Public Service Commission of Oregon has refused to issue an order compelling the Oregon Electric Railway and Southern Pacific Railway to maintain a common user of the Oregon Electric Railway tracks in Hillsboro and a union station in that city, basing their refusal upon the fact that the labor and material required for such joint facilities can be used more advantageously for more important and necessary purposes during the war.

**Portland Railway, Light & Power Company, Portland, Ore.**—In answer to complaints of the neglect of streets in Portland by the Portland Railway, Light & Power Company, officials have notified the City Department of Public Works that work of repairing tracks and pavement between tracks has been undertaken on a large scale. It is claimed that in two months the traction company has spent \$10,000 in making repairs and in rushing other work as fast as possible. Other work to cost \$5,000 will be started soon.

**Manila Electric Railroad & Light Corporation, Manila, P. I.**—A report from the Manila Electric Railroad & Light Corporation states that it will reconstruct 2 miles of track.

**Nashville-Gallatin Interurban Railway, Nashville, Tenn.**—A preliminary survey will be made by the Nashville-Gallatin Interurban Railway for an extension from Madison to Neeley's Bend Ferry to serve the government powder plant.

**Nashville Railway & Light Company, Nashville, Tenn.**—Surveys will soon be begun by the Nashville Railway & Light Company for an extension of its Gallatin turnpike line to near Hadleys Bend and also for an extension of the Fairfield line along the Lebanon Road.

**Bamberger Electric Railway, Salt Lake City, Utah.**—Announcement has been made by the Bamberger Electric Railway that automatic block signals will be installed between Robbins and Layton and Kaysville, thus making the entire line either double-tracked or protected by automatic block signals.

**Monongahela Valley Traction Company, Fairmont, W. Va.**—Announcement has been made by the Monongahela Valley Traction Company that the company plans to extend its lines from Clarksburg to Salem, Philippi and Grafton; from Weston to Orlando and from Fairmont to Morgantown. Work to the amount of \$3,000,000 is planned this year.

## Shops and Buildings

**Chicago, North Shore & Milwaukee Electric Railroad, Highwood, Ill.**—This company has leased the building at 185 Second Street, Milwaukee, for a station. Work on remodeling the lower floor will be begun at once. The erection of a station at Sixth and Sycamore Streets has been abandoned for the period of the war on account of the order of the government to railroads to curtail expenditures as much as possible.

**International Railway, Buffalo, N. Y.**—This company has leased the carhouse of the Niagara Gorge Railroad above the river bank at Second Street, where a car repair shop will be installed.

**Sand Springs (Okla.) Railway.**—A contract has been awarded by the Sand Springs Railway to H. L. Weir Contracting Company for the construction of a new carhouse.

**Portland Railway, Light & Power Company, Portland, Ore.**—Residents of Oak Grove have petitioned the Portland Railway, Light & Power Company to construct a new station at Oak Grove.

**Philadelphia, Pa.**—Sealed proposals will be received by the Department of City Transit, William S. Twining, director, until 12 o'clock noon on March 5 for the following work appurtenant to the Frankford Elevated Railway: Contract No. 529—Furnishing and delivering cast-iron fillet brackets for columns in Frankford Avenue between Church Street and Dyre Street. Sealed proposals will also be received until 12 o'clock noon on March 12 for the following work: Contract No. 537—Erection of brick and reinforced concrete station buildings at the northeast and southwest corners of Kensington and Allegheny Avenues, including the removal of existing buildings on these sites. Contract No. 538—Erection of brick and reinforced concrete station buildings at the southwest and southeast corners of Kensington Avenue and Somerset Street, including the removal of existing buildings from these sites. Copies of plans and specifications may be obtained upon deposit of \$10, to be refunded upon return of plans.

**Texas Electric Railway, Dallas, Tex.**—The new union interurban express building being constructed by the Texas Electric Railway for the Electric Express & Baggage Company has been practically completed. The new structure, which will cost about \$30,000, has accommodations for loading and unloading ten interurban express cars and twenty-one trucks at the same time. Delay in the arrival of rails prevents the opening of the building, which covers most of the block bounded by Young, Wood, Market and Jefferson Streets. The structure is fireproof and of modern design. The new building will handle express carried by the interurban railways operating between Waco, Denison and Corsicana.

**Virginia Railway & Power Company, Richmond, Va.**—This company will repair its brick warehouse at the foot of Twelfth Street, Richmond, at a cost of about \$6,000.

**Wheeling (W. Va.) Traction Company.**—Plans are being drawn by the Wheeling Traction Company for the reconstruction of its Bay Island carhouse recently destroyed by fire.

## Power Houses and Substations

**Alabama City, Gadsden & Attalla Railway, Gadsden, Ala.**—The turbine engines and generators of the Alabama City, Gadsden & Attalla Railway have been sold to the Chicago Utilities Development Corporation and the company will purchase a new outfit.

**Little Rock Railway & Electric Company, Little Rock, Ark.**—A contract has been awarded by the Little Rock Railway & Electric Company for the installation of a turbine in its power plant to provide improved lighting and electric railway service, at a cost of about \$200,000.

**Pensacola (Fla.) Electric Company.**—The erection of a 13,200-volt transmission line to the Pensacola Naval Station is being considered by the Pensacola Electric Company.

**Georgia Railway & Power Company, Atlanta, Ga.**—This company has completed its transmission line connecting Royston with its Gregg Shoals plant near Elberton.

**Vicksburg Light & Traction Company, Vicksburg, Miss.**—A new 1500-kw. turbine is being installed by the Vicksburg Light & Traction Company at its power plant in Vicksburg.

**Charleston Consolidated Railway & Light Company, Charleston, S. C.**—This company is considering increasing the output of its Meeting Street power house.

**Valley Railways, Lemoyne, Pa.**—New machinery is being installed at the power plant of the Valley Railways in Lemoyne.

**South Carolina Light, Power & Railways Company, Spartanburg, S. C.**—Extensive improvements are now being made on the gas plant of the South Carolina Light, Power & Railways Company and a new generator, with a capacity of 50,000 cu. ft. of gas, will be installed.

**Washington Water Power Company, Spokane, Wash.**—A contract has been awarded by the Washington Water Power Company to the General Electric Company for the installation of a new 22,500-hp. generator at its Long Lake power plant, which will increase the present capacity of the hydroelectric development by 50 per cent and will, with the two other units installed, utilize about three-fourths of the water power available there. The cost of the new equipment is reported to be more than \$250,000.



# Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

## Boiler Market Best in East

**Business Off in Middle West—Deliveries Six to Eight Months Without Priority Order**

The business in boilers of large steam capacity can at the present time be divided into three general classifications for analysis. They are, first, commercial business in the district between Pittsburgh and New York; second, commercial business west of Pittsburgh, and, third, marine business. East of Pittsburgh inquiries and orders are being handled in volumes above normal. This is due largely to the great amount of strictly war work in that territory, creating extraordinary demands for power that must be supplied. In the Middle West, where there is less war work, the boiler business while still good has fallen off somewhat. The largest buyers of boilers—the utilities—are not in the market for any more equipment than they must of necessity purchase. A better market for boilers in the Middle West is expected to prevail in the coming months regardless of whether the war continues or ends quickly. If the war continues, it seems inevitable that the war business will spread over a wider territory than it now takes in. There are several good fuel fields west of Pittsburgh, and it is believed that the logic of distributing government business more widely, from a geographical standpoint, will become recognized.

### DELIVERIES 6 TO 9 MONTHS

This naturally is expected to help boiler business in the Middle West. On the other hand, if the war suddenly stops, public-service business is expected to again flourish, since the lack of capital is all that is preventing extensions of plant. The business in marine boilers is so heavy that some of the prominent factories are looking for ways to get the business divided between their competitors rather than trying to do all of the work themselves. On the whole, the boiler manufacturing industry is far behind with its orders. Deliveries on commercial boilers are from six to nine months without a priority order. With an A-1 priority order a commercial customer might get a delivery anywhere from two to three months.

Some of the boiler manufacturers are taking advantage of the "sellers' market" that conditions have created to put into effect selling policies that they believe are for the ultimate good of customers but which there was no way of enforcing under ordinary conditions. Manufacturers claim that cen-

tral stations and some industrial plants are apt to make the mistake of wanting to install boilers that are too large. No boiler in a plant, say these manufacturers, should be so large that its loss in times of peak load will affect the operation of the plant if it is a station that stands alone, or will affect the operation of the system if it is an interconnected plant. In the past all argument to this effect has had little effect on customers. They thought they knew what they wanted and ought to have. In some cases boilers too large for the plant have been sold with a written protest from the manufacturers as a part of the contract. Nevertheless, this has not prevented the customer from coming back on the manufacturer if the boiler went wrong as was predicted. Nothing seems able to prevent that. So at least one company now is making it an absolute rule not to sell boilers that it knows are too large for the plant in which they are to operate. If it cannot convince a customer that he should buy boilers of sensible sizes, it is willing that some other manufacturer should get the business and thereby make himself responsible for future unpleasant developments.

## Car Deliveries in Five to Six Months

**Materials and Labor Situation Govern—One Large Priority Order Taken on Three Months' Delivery**

Nic Le Grand, general sales agent, St. Louis Car Company, is authority for the statement that car builders are now shipping cars as a rule within five or six months from the receipt of the order. He writes commenting upon a note in this department quoting a longer delivery than the period mentioned, and says a longer time is not necessary. He continues:

"Car builders are experiencing some difficulty in obtaining materials promptly, the labor situation is not the best, but notwithstanding these drawbacks the St. Louis Car Company is manufacturing and shipping cars within five to six months from date of contract, delivery depending upon type of car. While we are serving the government to the best of our ability, we are soliciting and actually obtaining car work and can, as already stated, make deliveries of from five to six months."

Confirming Mr. Le Grand is a delivery quotation of three months on a priority order placed within the past month for a large number of cars for use in carrying workmen to and from a shipyard.

## New Differentials on Iron and Steel Scrap

**Basic Prices Which Were Approved by President Wilson as of Dec. 27 Remain Unchanged**

Price differentials on iron and steel scrap, prepared on Dec. 27 last, have been revised by the American Iron and Steel Institute. The fixed base prices as approved by the President are retained, namely:

No. 1 heavy melting, \$30 per gross ton; No. 1 railroad wrought, \$35 per gross ton; machine shop turnings and cast-iron borings, \$20 per gross ton, all delivered to consumer's mill.

On Dec. 28, by the authority of the President, these base prices were continued operative until March 31, 1918.

By this announcement it was intended that no one—producer, consumer, merchant or broker—should buy, sell or deal in scrap iron and steel at any figure in excess of the base prices announced.

The differentials announced on Dec. 27 are canceled, together with any interpretation subsequently announced.

The maximum prices, using the new differentials from the base, on iron and steel scrap as recommended by the sub-committee on scrap iron and steel and approved by the committee on steel and steel products are as listed below:

1. No. 1 heavy melting steel (base).....	\$30.00
2. Low phosphorous steel scrap:	
Grade A .....	40.00
Grade B .....	37.50
Grade C .....	35.00
3. Steel rails, structural steel, etc.....	35.00
4. Standard section old steel tee rails ..	35.00
5. Nickel steel (1 per cent nickel).....	34.00
(\$4 additional per unit of nickel.)	
6. No. 1 railroad wrought.....	35.00
7. Iron and steel railway axles.....	47.50
8. Cast iron scrap:	
Grade A .....	30.00
Grade B .....	35.00
Grade C .....	30.00
Grade D .....	35.00
9. Machine shop turnings:	
Grade A base.....	20.00
Grade B base.....	25.00
Grade C base.....	25.00
(Plus a differential of not more than \$4 per unit of nickel content.)	
10. Cast iron borings:	
Grade A base.....	20.00
Grade B base.....	25.00

The above prices are the maximum which may be paid; buyers and sellers may contract at any price below the figures named.

All the above prices and differentials are per gross ton of 2240 lb., and in all cases include all freight and charges delivered f.o.b. cars at the consuming mill. Further information may be had by communicating with W. Vernon Phillips, chairman, sub-committee on scrap iron and steel, American Iron and Steel Institute, Pennsylvania Building, Philadelphia, Pa.



## Power House Equipment Quiet

Prices Are Not Softening—Deliveries Running Farther Behind—  
Much Priority Work in Hand

Power houses have not been buying very heavily of equipment for quite some time. Companies which had made commitments for several years ahead, as in normal times, were confronted with the fact that other arrangements had to be made for lack of capital requirements. Machinery and apparatus purchased for 1918 delivery will doubtless be accepted, but it is a question whether or not contracts entered into for 1919 and 1920 can be canceled or deferred. It is said negotiations of this kind have been under way, but no one feels disposed either to confirm or deny the statement.

Whatever the outcome, it is certain no abatement of price has occurred, and deliveries have not greatly improved. It was judged that if cancellations could be arranged it would have favorably affected both prices and deliveries. One prominent manufacturer, whose line has a world-wide reputation, said very little new development work was being undertaken, and such additions to power plants as had been made or were under way were necessary. He stated there had been no change of price in six months, and, so far as could be understood, none was expected for a long time ahead, unless the unforeseen happened.

Remarks of this nature, however, failed to convince the observant that the volume of buying in the aggregate represented anything but respectable figures. Also it was evident that if guaranteed promises of delivery could be secured the purchase of apparatus, accessories, material and supplies for power houses would be still more active. A manufacturer, in offering the explanation that everything above 200 kva. was rated power-house apparatus, also added that goods of this kind were back from five to nearly eight months on delivery. On a recent order for three transformers of 1000 kva. by special pressure delivery was promised in four and a half months, and generators, which were all of a special type and size to suit requirements, could not be shipped sooner than twenty to thirty weeks, possibly five and a half months. Turbines could not be promised under a year. On the larger sizes the delivery time was very long, from one year to the latter part of 1920. Motors of 25 hp. for auxiliary equipment would not be ready for shipment from six to eight months. Generators were to be had quickly only on priority orders from the War Industries Board for plants either engaged in the manufacture of munitions or other war material and needing additional power or for established power house or central stations supplying energy either for other industries of the same class or for military or naval needs. These orders superseded everything, and apparatus on order for private uses is being commandeered and appropriated, no matter how essential it might be in

the regular business of a commercial enterprise.

Condensers are reported as being in comparatively little demand by power houses. Public utility companies were practically out of the market for the present owing to the abnormal conditions. Deliveries are from nine to eighteen months late. Raw material is difficult to obtain, particularly to fill commercial orders. Advances in price had been made for a while almost every month, though none has been reported since the first of the year, and no further advance is anticipated. Pumps, according to another manufacturer, are a little better on delivery, which for larger size were directly or indirectly for the government.

### BUSINESS MAINLY GOVERNMENT WORK

Another manufacturer stated power-house development now was mainly in connection with government work. On commercial orders for engines, boilers, steam superheaters and mechanical stokers, which were all either special types or assembled for special needs, which was the same thing, deliveries were from five to eight months in arrears. No change had occurred in prices and none was expected.

Switchboards, circuit breakers, meters and all current-measuring devices are from seven to nine months behind on delivery. The only material that has decreased in price is copper, but this is so small as scarcely to affect the cost of the finished article. Steel is hard to obtain.

A cable manufacturer stated that no change in the price of his products has occurred since Jan. 1. Very little sale of power-house cable could be reported, and business has fallen off, excepting as regards government orders. Last year at this time the same producer remarked he had orders for several hundred thousand feet of cable on delivery for June and July. This year he had not booked a single order. He could only account for it on the score of slow payment on the part of utilities, which therefore could not assume additional obligations. A second manufacturer was of the opinion that notwithstanding the sale of underground cable was slow, before the end of the year a large and profitable power business would be booked. This assertion was based on the growing demand for energy, which the shortage of fuel had greatly emphasized, and was sure to expand the call for additional service.

### New Ordnance Department Official

Waldo H. Marshall, formerly president of the American Locomotive Company and now associated with J. P. Morgan & Company, has been appointed assistant chief of the Division of Production of the Ordnance Department.

## Rolling Stock

St. Louis (Mo.) Car Company has received an order from the Saginaw-Bay City Street Railway Company, Saginaw, Mich., for seven 28-ft. double-end, double-truck city cars, and fourteen one-man light safety cars. Ten of the latter will be for double-end operation and four for single-end operation. Both the double-truck and one-man cars will be mounted on St. Louis Car Company trucks. The ELECTRIC RAILWAY JOURNAL of Jan. 5 mentioned the fire that destroyed thirty-five cars and a section of the carhouse, the loss being placed at \$200,000.

Capital Traction Company, Washington, D. C., is reported as about to add twenty new cars to its rolling stock equipment. The Public Service Commission of the district has been notified by J. H. Hanna, vice-president of the company and in charge of operation, who is investigating the type of cars to be purchased.

Wheeling (W. Va.) Traction Company is reported to be in the market for new cars, following the fire, on Feb. 4, which destroyed twenty-nine cars and the carhouse, reported in the ELECTRIC RAILWAY JOURNAL of Feb. 9. The Jewett Car Company has an order from the Wheeling Company for fourteen double-truck cars, the delivery of which will be hastened. In the meantime the company plans to reconstruct all of the old motors and trucks as soon as the Westinghouse Electric & Manufacturing Company can supply the needed equipment. The Bay Island carhouse will be rebuilt as soon as possible.

Philadelphia (Pa.) Rapid Transit Company.—In the order for 100 cars now being built by the J. G. Brill Company, as mentioned in the ELECTRIC RAILWAY JOURNAL of Feb. 9, the following equipment was supplied by Holden & White, Inc.: 800 Garland ventilators, 400 Perry side bearings and 400 Anderson slack adjusters; by the National Railway Appliance Company, 400 each of gears and pinions, and 200 Wasson trolley bases; by the General Electric Company, 100 quadruple motor equipment (four motors to a car) and 100 air brakes. The cars are to be 40 ft. long, of the type now in use by the Philadelphia Company, and are to be delivered in ninety days. The order came through the Emergency Fleet Corporation and goes through on a priority certificate, as the new rolling stock is to be operated on the line to the Hog Island shipyards of the American International Corporation.

Brooklyn (N. Y.) Rapid Transit Company, in compliance with the recommendation of the Public Service Commission, First District, referred to in last week's ELECTRIC RAILWAY JOURNAL, to supply fifty trail cars, will rebuild and re-equip the rolling stock in its own shops, and also convert the 100 center-entrance cars for multiple-unit

operation, besides the fifty motor cars to serve as leaders for the two-car trains.

### Trade Notes

Babcock & Wilcox Company, New York, N. Y., has moved its Boston, Mass., office from 35 to 49 Federal Street.

Asbestos Protected Metal Company, Pittsburgh, Pa., announces the removal of its Boston, Mass., office to the State Mutual Building, to be in charge of William H. Cummings.

Wagner Electric Manufacturing Company, St. Louis, Mo., has insured its 3000 employees, up to \$1,000 each, for 1918. The company pays the premium on the entire amount of insurance.

C. W. Hunt Company, Inc., New York, N. Y., manufacturer of coal-shoveling machinery, has removed its offices from 45 Broadway to the Astor Trust Building, 501 Fifth Avenue.

Department of Commerce, Washington, D. C., has published "Foreign Tariff Notes" No. 26, issued by the Bureau of Foreign and Domestic Commerce. The pamphlet has a special chapter on "Effect of the War on Tariff Policies."

General Electric Co., Lynn, Mass., on Feb. 5 distributed bonuses to about 13,000 employees who have worked continuously for it for five years. Five per cent of the total earnings of the past six months was paid, and the total amount disbursed was about \$100,000.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., announces the removal of its branch office from Phoenix to Tucson, Ariz. J. H. Knost and W. G. Wilson, the company's representatives, will have headquarters in the Immigration Building.

Swan & Finch Company, New York, has just celebrated its sixty-fifth birthday, having started in February, 1853, in a small way. At the present day the company has classified 103 industries in which one or more of its products are used. Its main plant at Bayway, N. J., covers more than 15 acres.

H. W. Johns-Manville Company, New York, N. Y., has opened a branch house in its new building, corner of Olive and

Eleventh Streets, St. Louis, Mo. It is a six-story structure of modern fire-proof construction. Whenever practicable the company's products were used in the finishing of the building.

Esterline Company, Indianapolis, Ind., announces the appointment of the Northern Electric Company, whose main office is at Montreal, as exclusive distributors of Esterline products for the entire Dominion of Canada. The Northern company has branch offices in Halifax, Ottawa, Toronto, London, Winnipeg, Calgary and Vancouver.

Schweitzer & Conrad, Inc., Chicago, Ill., has recently appointed the Frankline Sales Company, Denver, Col., district representative for Wyoming, Colorado, New Mexico, Arizona, Utah, the western portion of Nebraska and the eastern portion of Montana and Idaho. The Frankline company will sell the entire line of S. & C. protecting and switching devices.

Maxwell Engineering & Manufacturing Company, New York, N. Y., is a new company established at 61 Broadway to manufacture electrical specialties, transmission line equipment, transmission line hardware and outdoor and indoor substations. Mr. Maxwell, president and general manager of the company, was for the past five years sales agent for the Hickey & Schneider line.

National Railway Appliance Company, New York, has taken the agency for the South, New England and New York State for "Rimeco" rubber insulated pliers, manufactured by the Rubber Insulated Metals Corporation, Plainfield, N. J. The Electrical Service Supplies Company, Philadelphia, Pa., has the sale of this specialty in its territory. The Plainfield company is reported as about bringing out a complete lineman's kit of moulded rubber insulation.

Western Contracting Company, San Francisco, has the contract for constructing two tracks on Market Street, between Geary Street and Van Ness Avenue, for the San Francisco Municipal Railway. The contract calls for the installation of 13,000 ft. of single track, with eighteen pieces of special track work, crossings, branch-offs, etc. The Western Contracting Company was formerly the Western Motor Driving Company. A. J. Crocker, 351 Noe Street, San Francisco, is president.

### New Advertising Literature

Harvey Hubbell, Inc., Bridgeport, Conn.: Leaflet descriptive of its Hubbell lamp guard.

W. N. Matthews & Bro., Inc., St. Louis, Mo.: Catalog descriptive of its line-material specialties.

Ohio Brass Company, Mansfield, Ohio: Folder descriptive of its luminous and incandescent type of headlights.

Thompson Electric Company, Cleveland, Ohio: New catalog, which is more comprehensive than anything the company has had heretofore. Copies may be had by writing.

Fred T. Ley & Company, Inc., Springfield, Mass.: Illustrated catalogs descriptive of the company's transmission systems and power houses, the latter having been built within the last two or three years.

Manganese Track Society and Manganese Steel Founders' Society, Chicago, have just issued Booklet No. 7, giving rules and detailed design for laying out solid manganese steel frogs. The previous books of recommended standards issued have been: No. 1, steam railroad frogs; No. 2, steam railroad crossings; No. 3, manganese steel switch points; No. 4, groove and flare in guard in crossings and frogs; No. 5, manganese steel track work for steam railroads; No. 6, railbound manganese steel frogs.

Farnsworth Company, Conshohocken, Pa.: Illustrated bulletin descriptive of its condensation utilities. The following apparatus are described: Duplex boiler feeder, duplex condenser-vacuum boiler-feed pump, duplex pumping trap, duplex condenser-vacuum pumping trap, direct-return condenser-vacuum trap, direct-return trap, pumping trap, condenser-vacuum pumping trap, high-vacuum trap, separating or non-return trap, variable-pressure trap or combined pumping and non-return or separating trap, and variable-pressure condenser-vacuum pumping and separating trap. A chart showing the coal which can be saved by increasing the temperatures of the feed water by using the machines made by this company with closed system, or keeping the condensation under pressure, is given.

### RAILWAY MATERIALS

	Feb. 20	Feb. 27
Rubber-covered wire base, New York, cents per lb.	27-34	27-30
Weatherproof wire (100 lb. lots), cents per lb.		
New York	28 1/4 to 34 1/4	28 1/4 to 34 1/4
Weatherproof wire (100 lb. lots), cents per lb.		
Chicago	33 1/2 to 38.35	33 1/2 to 38
Rails, heavy, Bessemer, Pittsburgh	\$55.00	\$55.00
Rails, heavy, O. H. Pittsburgh, per gross ton	\$57.00	\$57.00
Wire nails, Pittsburgh, per 100 lb.	\$3.50	\$3.50
Railroad spikes, 9/16 in., Pittsburgh, per 100 lb.	\$3.90	\$3.90
Steel bars, Pittsburgh, per 100 lb.	\$5.00	\$5.00
Sheet iron, black (24 gage), Pittsburgh, per 100 lb.	\$4.85	\$4.85
Sheet iron, galvanized (24 gage), Pittsburgh, per 100 lb.	\$5.80	\$5.80
Galvanized barbed wire, Pittsburgh, cents per lb.	\$4.35	\$4.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.	\$3.95	\$3.95
Cement (carload lots), New York, per bbl.	\$2.25	\$2.25
Cement (carload lots), Chicago, per bbl.	\$2.31	\$2.31
Cement (carload lots), Seattle, per bbl.	\$2.65	\$2.65
Linseed oil (raw 5 bbl. lots), New York, per gal.	\$1.33	\$1.35
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	\$1.34	\$1.36
White-lead (100 lb. keg), New York, cents per lb.	10	10
Turpentine (bbl. lots), New York, cents per gal.	47 1/2	46 1/2

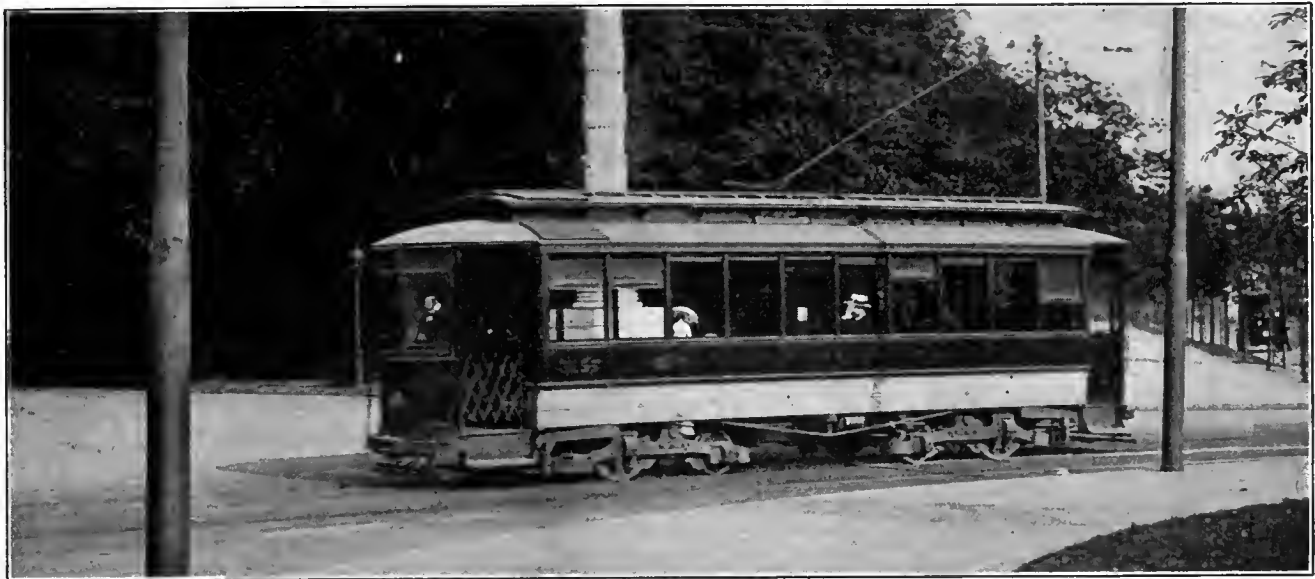
\*Nominal.

### NEW YORK METAL MARKET PRICES

	Feb. 20	Feb. 27
Copper, ingot, cents per lb.	23 1/2	23 1/2
Copper wire base, cents per lb.	27	27
Lead, cents per lb.	7	7 1/4
Nickel, cents per lb.	50	50
Snelter, cents per lb.	8	8
Tin, Straits, cents per lb.	\$85.00	\$85.00
Aluminum, 98 to 99 per cent, cents per lb.	34-36	35-37

### OLD METAL PRICES—NEW YORK

	Feb. 20	Feb. 27
Heavy copper, cents per lb.	22	22
Light copper, cents per lb.	19 1/2	19 1/2
Red brass, cents per lb.	17 1/2	18
Yellow brass, cents per lb.	13	13
Lead, heavy, cents per lb.	6	6
Zinc, cents per lb.	5 1/2	5 1/2
Steel car axles, Chicago, per net ton	\$42.42	\$42.41
Old car wheels, Chicago, per gross ton	\$30.00	\$30.00
Steel rails (scrap), Chicago, per gross ton	\$35.00	\$35.00
Steel rails (relaying), Chicago, per gross ton	\$60.00	\$60.00
Machine shop turnings, Chicago, per net ton	\$17.00	\$17.00



# 2851 Sets of Peacock Brakes

are now in use on the B. R. T.

As the result of 12 years of continuous testing, trying and experimenting under severe usage the Brooklyn Rapid Transit System has standardized its brake equipment—Peacock Brakes.

There are long stretches out to the beaches where high-speed conditions obtain.

There are crowded corners in the business district where

traffic jams are the worst imaginable.

There are long steep inclines on the bridges and their approaches, where excellent braking equipment is essential.

But for all these purposes the B. R. T. selected **Peacock Brakes!**

Does it mean anything to you?

**National Brake Co.**  
Buffalo, N. Y.



The Eccentric  
Drum

# Bankers and Engineers

## The Coal & Iron National Bank of the City of New York

Capital, Surplus & Profits \$1,635,000  
Resources Nearly \$10,000,000

Offers to dealers every facility of a New York  
Clearing House Bank.

## THE J. G. WHITE COMPANIES

ENGINEERS  
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CONTRACTORS  
OPERATORS

43 EXCHANGE PLACE . . . . NEW YORK  
LONDON CHICAGO

## SANDERSON & PORTER ENGINEERS

REPORTS • DESIGNS • CONSTRUCTION • MANAGEMENT  
HYDRO-ELECTRIC DEVELOPMENTS

RAILWAY, LIGHT AND POWER PROPERTIES  
CHICAGO NEW YORK SAN FRANCISCO

## THE ARNOLD COMPANY

ENGINEERS—CONSTRUCTORS  
ELECTRICAL—CIVIL—MECHANICAL  
105 SOUTH LA SALLE STREET  
CHICAGO

## Ford, Bacon & Davis, Engineers.

115 BROADWAY  
New Orleans NEW YORK San Francisco

ALBERT S. RICHEY  
ELECTRIC RAILWAY ENGINEER  
WORCESTER POLYTECHNIC INSTITUTE  
WORCESTER, MASSACHUSETTS

## STONE & WEBSTER

Industrial Plants and Buildings, Steam Power Stations,  
Water Power Developments, Substations, Gas Plants,  
Transmission Lines, Electric and Steam Railroad Work.  
NEW YORK BOSTON CHICAGO

## H. M. Byllesby & Company, Inc.

NEW YORK CHICAGO TACOMA  
Trinity Bldg. No. 208 So. La Salle St. Washington

Purchase, Finance, Construct and Operate Electric Light,  
Gas, Street Railway and Water Power Properties.  
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Analytical Studies of financial and operating conditions,  
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HYDRAULIC DEVELOPMENTS GAS WORKS  
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ELECTRICAL TESTING LABORATORIES  
Electrical, Photometrical and  
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## THE P. EDW. WISCH SERVICE

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SARGENT & LUNDY, Engineers  
1412 Edison Bldg., 72 W. Adams St., Chicago, Ill.

A. D. Lundy  
James Lyman



*Packard*

## Transformers

*Any kind, any size shipped any place any time. And Packard Transformers will become the best mechanical friends you have around the place. Twenty-four hours of satisfaction every day and no days off.*

*Packard Transformers embody all we have learned about transformers during the past twenty-five years in a specialized study of this product.*

*Write today Dept. E.R.J. for bulletin No. 200 and you'll appreciate why Packard Transformers are better.*

*The Packard*  
**Electric Company**  
WARREN, OHIO

### Represented by

Electric Appliance Co., Chicago, Dallas, New Orleans, San Francisco.  
Cincinnati, O., Post Glover Electric Co.  
Buffalo, N. Y., H. I. Sackett Electric Co.

Electric Service Supplies Co., Philadelphia, New York City, Chicago.

Charleston, W. Va., Charleston Elec. Supply Co.

Boston, Mass., Frank Ridlon Co.

Seattle, Wash., Burton R. Stare.

Nashville Tenn., Braid Electric Co.

### District Offices

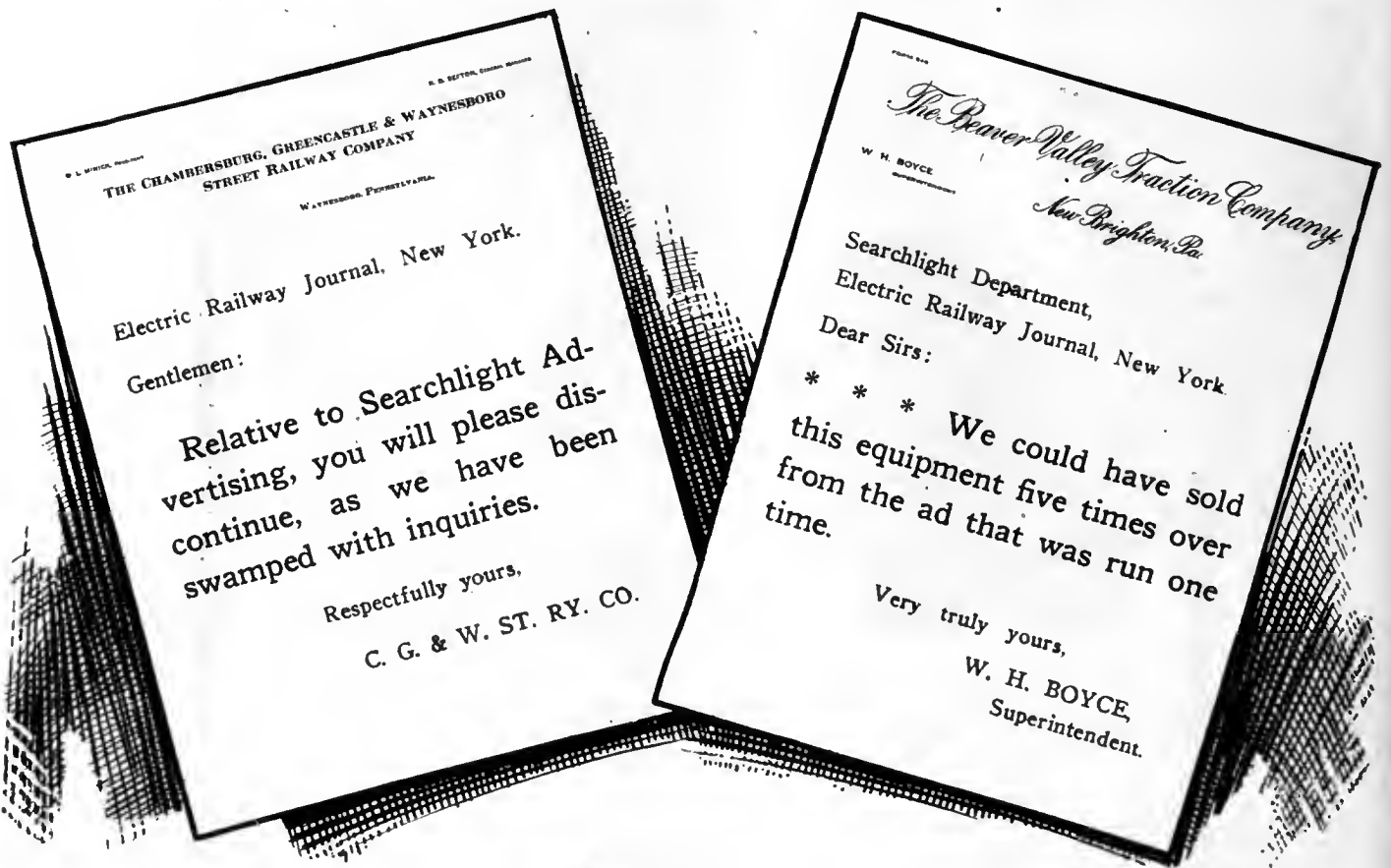
Los Angeles, Cal., San Fernando Bldg., J. G. Monahan, Mgr.  
Denver, Colo., Colorado Natl. Bk. Bldg., Duncan Bond, Mgr.  
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*Transformers*



# Business is Booming!



*Are you  
getting your share?*

Second-hand equipment is commanding a premium. Look over your stock and convert it into cash. Send us the list.

## Searchlight

advertising

will find the anxious buyer for you.

*SEND US YOUR LIST*

Electric Railway Journal, 10th Ave., at 36th St., New York

# Imperial Flood Light Projectors



Type SDY

Type SCE  
(1000 watts)

Type SDA



Type SDR



## Protecting Bridges

Guarding Tracks, Freight Yards, Round Houses.—On 24 hours-a-day rush jobs.—Speeding up night construction work to day-time output.—

**Wherever Night has to be turned into Day  
Imperial Flood Light Projectors are found**

They solve both the working-at-night and the protecting-at-night problems.

Their strong, steady beam is directed, spread or contracted by the simplest movements. They are made in many distinct types and take flood-lighting Mazda lamps up to 1000 watts, 105-130 volts.

Imperial projectors are of rugged build. Their casing of rust-proof material makes them thoroughly weatherproof and insures years of service. Adequate ventilation is also provided for.

Our many years' experience is at your service. Tell us your conditions and we will send along full data on Floodlight Projectors.

## CROUSE-HINDS COMPANY

SYRACUSE, N. Y., U. S. A.

NEW YORK

BOSTON

CHICAGO



# The Morale of Your Men

**M**EN, guns and ammunition are necessary to win wars, but men, guns and ammunition will not win wars unless the "morale" of the men is right. What they think; what they believe; what they hope—these are deciding factors.

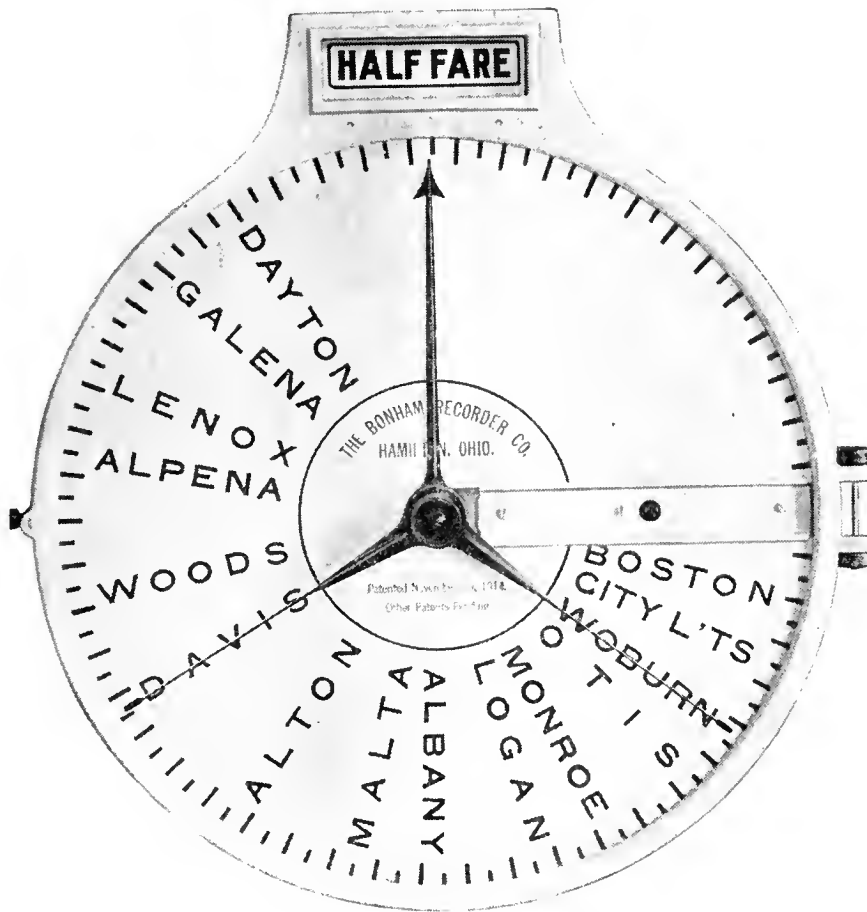
"Morale" is as important to an electric railway company as it is to an army. Your conductors must have more than intelligence and skill. They must have the desire to use their intelligence and skill for the betterment of the business.



The **OHMER SYSTEM** of fare protection creates the right quality of "morale" among conductors. It supplies a mechanism for properly indicating and recording each fare paid. It offers to the conductor a real incentive to work "On the Square." It bolsters up his self-respect. It places upon his shoulders just the right amount of steady responsibility.

Let us show you just how we would apply the **OHMER SYSTEM** to your property. You will be under no obligation to us.

**OHMER FARE REGISTER COMPANY**  
DAYTON, OHIO.



## Cut the Cost Increase the Revenue

This is the aim of every railroad manager.

The Bonham Traffic Recorder accomplishes both. It not only does this but gives, ready tabulated, all the traffic data, including:

- Density of Traffic by Stations.
- Revenue per Passenger Mile.
- Revenue per Car Mile.
- Revenue per Car Hour.

These recorders are saving other roads over \$300.00 in money a year per car.

They will do it for you.

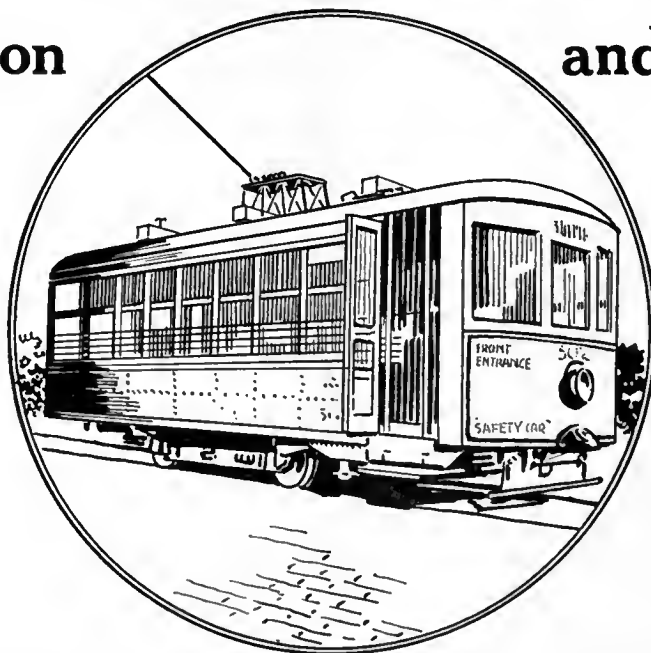
Let us show you how it can be done on your road.

## The Bonham Recorder Company

Hamilton, Ohio

# INTERNATIONAL

## Fare Collection and Registration



### For Single-End Operation One-Man Light-Weight Safety Cars

As yet nobody knows to what degree the Light-Weight Safety Car is going to displace the slower-moving, more costly big fellows; but it has already proved itself worthy on lines that are of real importance as revenue producers. The new conditions due to the operation of such cars by one man instead of two and the need for meeting local variations in fare units have received our earnest thought. If the following

#### *Suggestions for Single-End Cars*

do not fit your case, tell us what you want and we'll see that you get it.

**FOR STRAIGHT 5-CENT CASH FARES**—Use the International C 15 hand operated Coin Register on lines where traffic is moderate, or motor operated when traffic is heavy.

**FOR CASH AND TRANSFERS**—Use the International C 21.

**FOR CASH AND PAPER TICKETS BUT NO TRANSFERS**—You can use the International C 21 just as readily, lettering the two registering mechanisms accordingly.

**FOR CASH, PAPER TICKETS AND TRANSFERS**—Use the International C 22, a three-section machine with the central division operated via the fare box crank, while the other sections have pull cords.

**FOR CASH AND METAL TICKETS**—Use the International C 14.

**FOR CASH, METAL TICKETS AND TRANSFERS**—Use the International C 20.

**And any one of these Internationals can be furnished in the Motor-Driven Types originated and perfected by us.**

## THE INTERNATIONAL REGISTER COMPANY

15 South Throop St., Chicago

Manufacturers of Coin Registers, Fare Boxes, Double and Single Car Registers and Fittings,  
Conductors' Punches and exclusive agents for Heeren Enamel Badges





*Photograph by permission and  
courtesy of The Connecticut Co.*

The use of these materials insures supreme durability  
and minimum maintenance costs.

## The Pantasote Co.

11 Broadway, New York

People's Gas Bldg., Chicago, Ill.

797 Monadnock Bldg., San Francisco, Cal.

# The Best Bearings Need Good Lubrication to Save Power and to Avoid Hot Boxes



**Y**OU can't expect the babbitt to do all the work in a bearing. So properly placed, clean-cut oil grooves are a necessity in getting full life and full satisfaction out of a bearing.

**Y**OU'LL get that full life and full satisfaction out of Columbia bearings just as you will from all other Columbia products, whether tools or car equipment.

## Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St.

Brooklyn, N. Y.

W. R. Kerschner Co., Inc., N. Y.

Holden & White, Inc., Chicago

F. F. Bodler, San Francisco

Railway & Power Eng. Corp., Ltd., Toronto, Can.

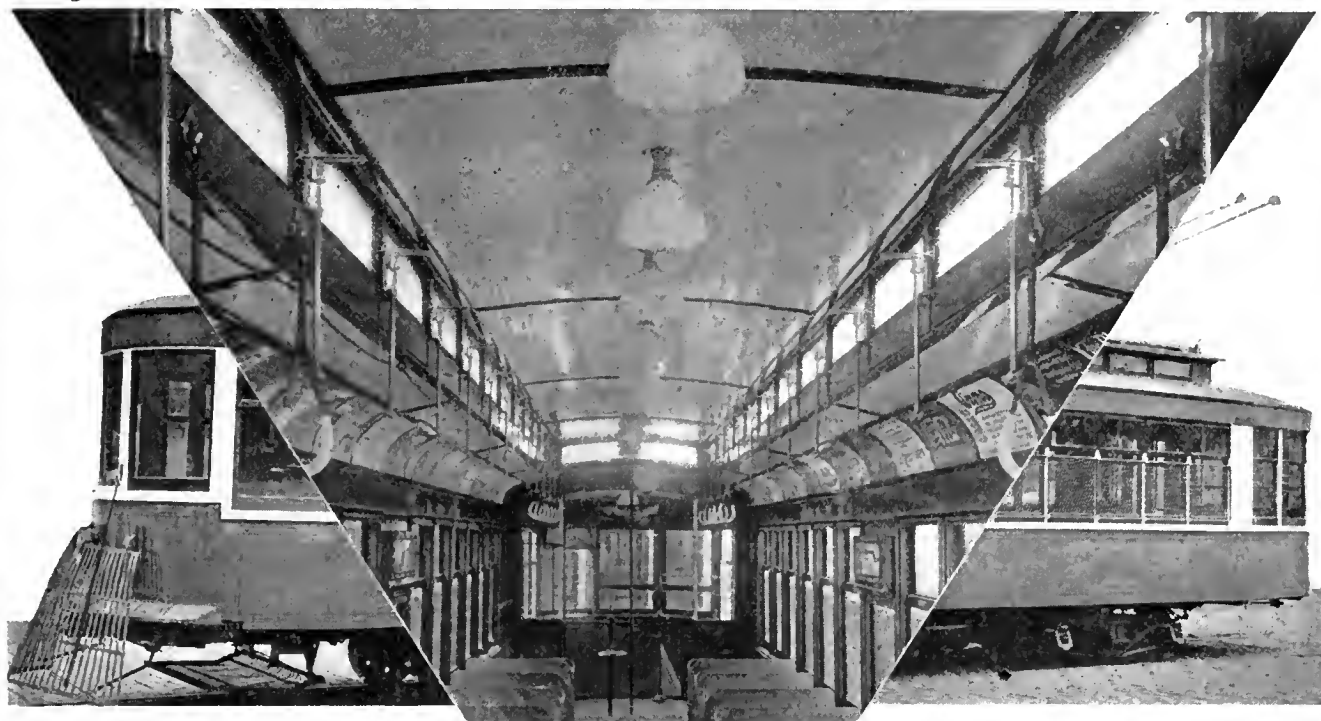
### TOOLS

Armature and Axle Straighteners  
Armature shaft straighteners  
Armature buggies and stands  
Babbitting molds  
Banding and heading machines  
Car hoists  
Car replacers  
Coil taping machines for armature leads  
Coil winding machines  
Pinion pullers  
Pit jacks  
Signal or target switches  
Tension stands

### CAR EQUIPMENT

Armature and axle bearings  
Armature and field coils  
Bearings (axle and armature)  
Brush-holders and brush-holder springs  
Brake, door and other handles  
Brake forgings, riggings, etc.  
Car trimmings  
Commutators  
Controller handles  
Forgings of all kinds  
Gear cases (steel or mall. iron)  
Grid resistors  
Third-rail shoe beams and accessories  
Trolley poles (steel) and wheels





Interior view of one of 26 new cars just put into service by the South Covington & Cincinnati Street Railway. Note the smooth, neat surface of the headlining.

## Nevasplit Headlinings

“Nevasplit” is, first of all, a wood fibre.

It won't warp or shrink, it has no grain, so will not split or “check.” Its smooth, even surface takes paint readily.

“Nevasplit” is waterproof and of minimum conductivity. It is absolutely uniform in texture. “Nevasplit” is NOT veneered lumber but wood fibre in the highest form of refinement, possessing constructional features and beauty of appearance that make its use an essential for headlining, insulation roofs and interlining of cars.

To specify “Nevasplit” means a positive saving of money.

Let us send samples of “Nevasplit” so you can see with your own eyes the advantages of this material for YOUR cars.

# The Keyes Products Company

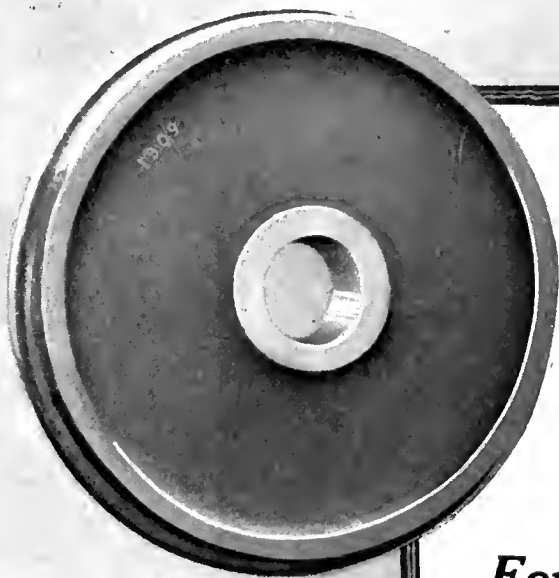
120 Broadway, New York

NEW YORK

W. R. Kerschner Co., Inc.  
50 Church St.

SAN FRANCISCO

Ford & Geirrine  
Merchants' Exchange Bldg.



## The Wonderful Single-Service Chilled-Iron Wheel

## Standard for 67 Years

The Chilled Iron Wheel has performed its every function at a minimum cost.

### *For Freight Cars*

95% of all cars in this type of service are carried on Chilled Iron Wheels.

### *For Street Cars*

The Chilled Iron Wheel is Standard for Street Car Service in 95 out of 100 cities in the United States and Canada, operating 100 cars or over.

### *The Conclusion*

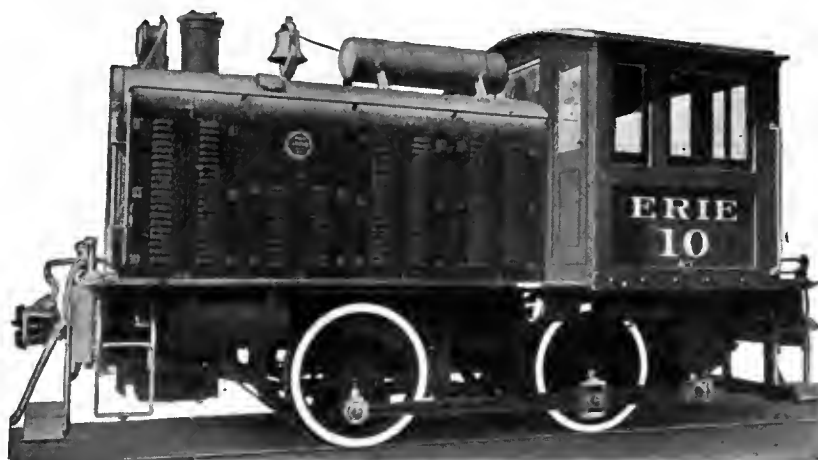
to be gained from these figures is that the Chilled Iron Wheel gives the Greatest Service for the Lowest Cost.

Association of Manufacturers of Chilled Car Wheels  
1228 McCormick Building, Chicago, Ill.

Representing Forty-eight Wheel Foundries Throughout the United States and Canada. Capacity 20,000 Chilled Iron Wheels Per Day.



# BALDWIN



## 23-ton Gasoline Locomotive

**F**OR light construction work, and for switching about shops and terminals, locomotives should be strongly built—dependable—economical—able to go wherever a track can be laid, clearance limits permitting. Gasoline locomotives meet these conditions admirably, provided they are properly designed for the service.

Baldwin Gasoline Locomotives merit careful investigation. They are built in five standard sizes, weighing respectively  $3\frac{1}{2}$ , 5, 7, 9, and 23 tons. Baldwin experience, built into them, guarantees that they will serve you well.

Electric Railways needing locomotives for light construction, terminal or shop service, should consider the use of these machines. They require neither third rail nor overhead wire, and to "charge up" it is simply necessary to refill the gasoline tank. Record No. 85 tells all about them.

**THE BALDWIN LOCOMOTIVE WORKS**  
Philadelphia, Pa.

REPRESENTED BY

F. W. Weston, 120 Broadway, New York, N. Y.  
Charles Riddell, 627 Railway Exchange, Chicago, Ill.  
C. H. Peterson, 1210 Boatmen's Bank Bldg., St. Louis, Mo.

George F. Jones, 407 Travelers' Building, Richmond, Va.  
A. J. Beuter, 312 Northwestern Bank Bldg., Portland, Ore.  
Williams, Dimond & Co., 310 Sansome St., San Francisco, Cal.



## “Dying Temporarily”



**I**T was Huckleberry Finn, we believe, who expressed the wish that he could “die temporarily.”

A good many of us are like that. Comes trouble, and we wish to crawl into some convenient and comfortable casket till the weather clears.

And a few business men *try* it—with their publicity. At each period of stress they commit advertising harakiri, in the fond belief that they can resume at the point of interruption whenever they so decide. Fortunately for American business, the number who do this is not great.



**T**HE blunt fact is that the concern which retires from its position in the eye of trade and public, either because its plant is oversold or because business is bad, admits itself to be unstable, and in the last analysis, uncourageous. It advertises that it cannot cope with conditions which other firms are meeting calmly.

What would you think if Ivory Soap absolutely stopped all advertising?

What would people think if *your* company stopped all advertising?

The Ivory Soap people *are not big enough* to be able to afford to “die temporarily.”

Neither are you.

Electric Railway Journal, 10th Ave. at 36th St., New York

Member Audit Bureau of Circulations



TRADE MARK  
REG. U. S. PATENT OFFICE.

## The Standard for Rubber Insulation

Railway Feed Wires insulated with OKONITE are unequalled for flexibility, durability, and efficiency and are in use by the leading Electric Street Railway Companies. OKONITE is preferred above any other insulation for Car Wiring, Telegraph and Telephone Purposes.

OKONITE WIRES—OKONITE TAPE  
MANSON TAPE—CANDEE WEATHERPROOF WIRES  
CANDEE PATENTED POTHEADS

*Samples and Estimates on Application*

**THE OKONITE COMPANY, 501 Fifth Ave., cor. 42nd St., New York**

CENTRAL ELECTRIC CO., Chicago, Ill., General Western Agents

F. D. Lawrence Electric Co., Cincinnati, O.

Novelty Electric Co., Philadelphia, Pa.

Pettingell-Andrews Co., Boston, Mass.



## You Can Minimize Overhead Repair Work

and successfully cut maintenance costs if you turn to

## The Macallen Line

of strain insulators, hangers, splicing ears, crossings, and other overhead material.

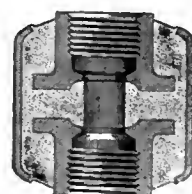
They are "specialty" products, designed and built to make "Macallen" the standard on American railways.

It will pay you to write for information and prices.

## The Macallen Insulating Joint

Adopted by principal air brake manufacturers as part of their standard equipment. Also insulates steam pipes, etc. Shell is seamless drawn steel, nipples are machined from steel rod, and insulating material is Macallen Vulcanite Compound, not affected by heat or oil—practically indestructible.

May We Send Our Catalog ?



**The Macallen Company**  
Macallen and Foundry Sts., Boston



## TROLLEY WIRE

### Round Grooved and Figure 8

If you will agree that one make of trolley wire is able to give longer service than another make—

That one is more economical than another—

Then investigate our trolley wire with a view to cutting your wire costs.



## Weatherproof Wires and Cables

### Star Brand

Star Brand Wires are made with long service as the most prominent feature.

Because of their ability to render long service they cut wire costs.

Read the words in the cut of the star.

# American Electrical Works

NEW YORK: 165 Broadway  
CHICAGO: 112 West Adams Street  
BOSTON: 176 Federal Street

Phillipsdale, R. I.

CINCINNATI: Traction Building  
SAN FRANCISCO: 612 Howard Street  
SEATTLE: 1002 First Avenue South

3105

# ENGLAND and GERMANY

despite their stupendous efforts in carrying on the greatest war in the world's history, still have *time* and *thought* and *money* for carrying on ambitious *trade plans* which will ripen, after the war so suddenly as to gain for the victor at least a year on the rest of the world.

Manufacturers who because of their

rush of work at this time devote neither *time* nor *thought* nor *money* to the building up of a trade which takes into account the period "after the war," will find themselves hopelessly in the rear when the great war barrier falls and the nations of the world start anew their perpetual race for commercial supremacy.

**Don't sit back on your *past* achievements**

**Don't bank on past customers**

**Keep your name and your product before them**

***Lest they forget!***

DU PONT AMERICAN INDUSTRIES

## Reduce Maintenance Costs

### By Adopting Quicker, Cheaper and Labor-Saving Methods

With the track and construction crews reduced by the country's call, every labor-saving agency must be employed to enable the work of track-repairing and extension to be accomplished with the remainder of the force.

### By the Use of Red Cross Explosives

to blast earth, shale and gravel ahead of graders and steam-shovels; to demolish culverts, piers, log and ice-jams; improve drainage conditions; prepare pole and post holes; shatter stumps and boulders, it will be found that Red Cross Explosives are actual labor savers in a very practical manner.

### Lower Your Expenses

by adoption of labor-saving methods based on the extensive experiences of our field forces while investigating the blasting operations required to construct the nation's railways. Tell us your blasting problems—let us help you to reduce your maintenance costs.

**E. I. du Pont de Nemours & Co.**  
Wilmington, Delaware

NOTE: When in Atlantic City, visit Du Pont Products Store, Boardwalk and Penn. Avenue.



#### The Du Pont American Industries Are:

E. I. du Pont de Nemours & Co., Wilmington, Del., Explosives  
Du Pont Chemical Works, New York, Pyroxylin and Coal Tar Chemicals.  
Du Pont Fabrikoid Co., Wilmington, Del., Leather Substitutes  
The Arlington Works, 725 Broadway, New York, Ivory Pyralin and Cleanable Collars.  
Harrison Works, Phila., Pa., Paints, Pigments, Acids, Chemicals.  
Du Pont Dye Works, Wilmington, Del., Dyes and Dye Bases.

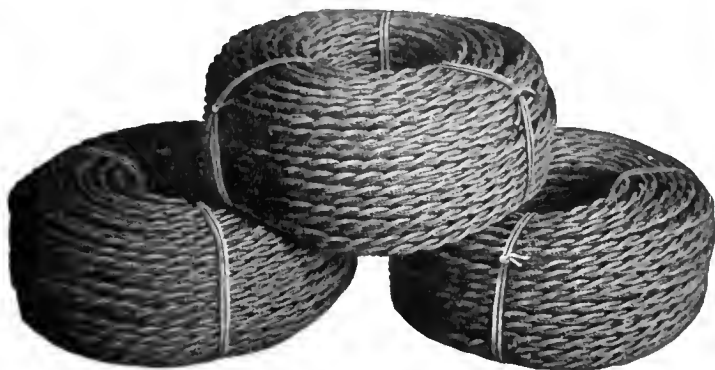
#### MAIL THIS COUPON

Mark X before subject of interest and send with address to Adv. Div. E. I. du Pont de Nemours & Co., Wilmington, Delaware.

- |  |                                       |  |
|--|---------------------------------------|--|
| <input type="checkbox"/> Explosives      | <input type="checkbox"/> Varnish      | <input type="checkbox"/> FABRIKOID         |
| <input type="checkbox"/> Blstg. Powder   | <input type="checkbox"/> Com'l Acids  | <input type="checkbox"/> Auto Top M't'l    |
| <input type="checkbox"/> Blstg. Supplies | <input type="checkbox"/> Ethers       | <input type="checkbox"/> Fairfield Cloth   |
| <input type="checkbox"/> Sptg. Powder    | <input type="checkbox"/> Solvents     | <input type="checkbox"/> PY-RA-LIN         |
| <input type="checkbox"/> Trapshooting    | <input type="checkbox"/> Dyes & Bases | <input type="checkbox"/> Tar Distillates   |
| <input type="checkbox"/> Paints          | <input type="checkbox"/> Bridgeport   | <input type="checkbox"/> Ref'd Fusel Oil   |
| <input type="checkbox"/> Enamels         | <input type="checkbox"/> Wood Finish  | <input type="checkbox"/> El. Ry. Jnl., '18 |



# ROEBLING ELECTRICAL WIRES AND CABLES



**WIRE ROPE**

**STRAND**

**JOHN A. ROEBLING'S SONS CO.**  
TRENTON, N. J.

#### BRANCHES:

New York    Boston    Chicago    Philadelphia    Pittsburgh    Cleveland  
Atlanta    San Francisco    Los Angeles    Seattle    Portland, Ore.

The Ingenuity  
Displayed in this  
device is of the  
**PRACTICAL**  
Kind



## The Anderson Line

is characterized by hard-headed practicability

Anderson specialties are designed by practical men for practical men and you can make sure that the advantages of Anderson devices are thoroughly sound, safe, and sane, practical improvements.

The above strain has every merit of high-grade materials and construction, with the added advantage of the ingenious Anderson "double take-up." Write for details of other money, time and trouble-saving Anderson specialties.

**Albert & J. M. Anderson Mfg. Co.**

289-293 A Street

(Established 1877)

Boston, Mass., U. S. A.



BRANCHES:  
New York, 135 Broadway  
Chicago, 105 So. Dearborn Street  
Philadelphia, 429 Real Estate Trust Bldg.  
London, E. C., 48 Milton Street



## On Rendering Dependable Service



**I**NASMUCH as the maximum production of war materials depends largely on the reliability of the means of transportation of the workman to and from his work, your rolling stock must be kept at the highest degree of dependability. Your rolling stock is no more reliable than the appliances that drive it—the gears.

Nuttall B P Treated Railway Gears are guaranteed to last four times as long as untreated cast steel gears in identical service, saving time and cost of new material.

The following table shows the average saving possible through the use of B P Treated Gearing:

*Compare these figures with your present results*

Grade	Relative Service	Relative First Cost	Cost of Cast Steel for Equal Life	Saving in Ultimate Cost
C. S.	100%	100%	\$30.00	
B. P.	350%	130%	\$39.00	\$66.00 63%



Write today for Heat Treatment of Gears and Bulletin No. 17.

**NUTTALL**  
PITTSBURGH





**It's a Standard—  
Sherardized or in Bronze**

or you can use an ordinary steel bolt in White's Porcelain Trolley Hanger.  
That is just one of the reasons it is *the* economical hanger.

**WHITE'S  
Porcelain  
Trolley Hanger**

is easily and quickly hung and aligned on the span wire—another reason it is *the* economical hanger.  
Three simple parts—the bolt—the sherardized malleable iron yoke that doesn't rust out—the heavy glazed porcelain insulator that doesn't break when the trolley strikes it—that doesn't deteriorate.  
Let us send you a sample hanger—then you can *see why* it is *the* economical hanger for you to use. We will quote you on complete hangers or parts for

*Immediate Delivery*

**T. C. White Electrical  
Supply Co.**

1122 Pine Street, St. Louis, Mo.



**RIMCO** Rubber Insulated  
**PLIERS**

for  
**High  
Tension  
Work**

Read  
the Tag  
attached  
to every  
Pair



**"RIMCO"  
RUBBER INSULATED  
PLIER**  
This pair tested and passed for  
10,000 volts by the Electrical  
Testing Laboratories of New  
York City. *Jul 16, 1917.*  
Date of test  
**CAUTION**  
Always see that "RIMCO"  
PLAINFIELD, N. J. is stamped  
on the insulation of plier to  
which this tag is attached.  
**GUARANTEE**  
We guarantee all "RIMCO"  
Rubber Insulated Pliers, bear-  
ing our name and aerial number,  
to be free from all imperfections  
in material and workmanship.  
**RUBBER INSULATED  
METALS CORPORATION**  
PLAINFIELD, N. J., U. S. A.  
Serial No. 6-5001

Rimco Rubber Insulated Pliers are cheaper than plain pliers with adjustable rubber sleeves.

Rimco Rubber Insulated Pliers last longer than any hard rubber insulation can last.

**The Rubber Insulated  
Metals Corporation**

Sole owners of the Elchemco Process  
for bonding rubber to metals, protected  
by American and Foreign Patents.

Plainfield, N. J.

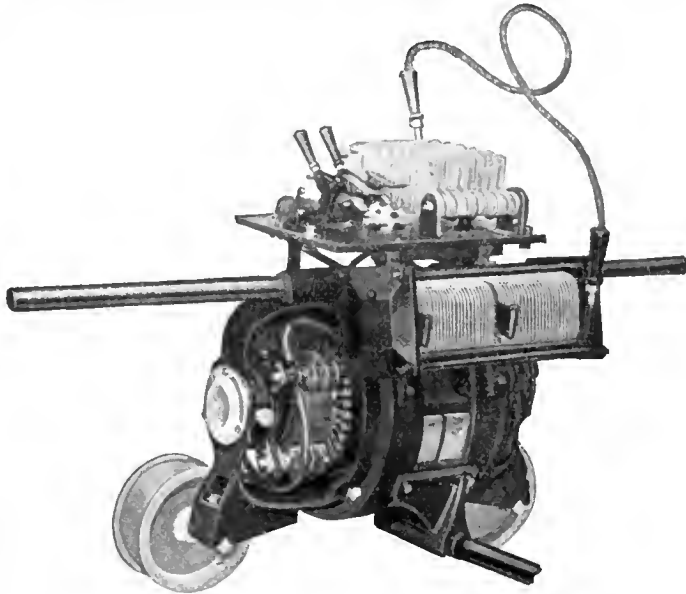


**SALES AGENTS**

Electric Service Sup-  
plies Co., 17th &  
Cambria Sts., Phila-  
delphia, Pa.

National Railway  
Appliance Co., 50  
East 42nd St., New  
York City.

Canadian Agent: Ly-  
man Tube & Supply  
Co., Ltd., Montreal,  
Toronto and Winni-  
peg.



**THE LINCOLN BONDING COMPANY**  
636 Huron Rd., Cleveland, Ohio.

**AGENTS:**

<b>BOSTON</b> Charles N. Wood Co.	<b>PITTSBURGH</b> Electrical Engineering & Manufacturing Co.	<b>ST. LOUIS</b> W. L. Rose Equip. Co.
<b>NEW YORK</b> Atlantic Welding Co.		<b>MILWAUKEE</b> W. C. Burdick
<b>PHILADELPHIA</b> Railway Track-work Co.	<b>CHICAGO</b> Holden & White, Inc.	<b>LOS ANGELES</b> Wigmore, Hall & Co.
<b>MONTREAL—CANADA:</b> Lyman Tube & Supply Co., Ltd.		

## Low Voltage Reduces Schedule Speed and Increases Platform Expense

"Exact knowledge of the voltage in each of the zones will show if the bonding is right," says a railroad expert.

The schedule speed and consequently the platform expense is seriously affected by excessive drop in voltage.

Lincoln Bonds applied with a Lincoln Bonder assures minimum drop in current transmission.

Ask us for Proof.

30 ton  
Hydraulic  
Press



Its open construction and easy operation suggest many labor saving operations.

It will pay you to write for catalogs showing bonding presses, punches, shears, benders for rails, rods, tubes, pipes, etc.

### The Watson-Stillman Co.

46 Church St., NEW YORK

Chicago, McCormick Bldg.  
Pittsburgh, Brown & Zortman.  
St. Louis, Corby Supply Co.  
Kansas City, Geo. T. Cook.  
Denver, L. C. Ulrich.



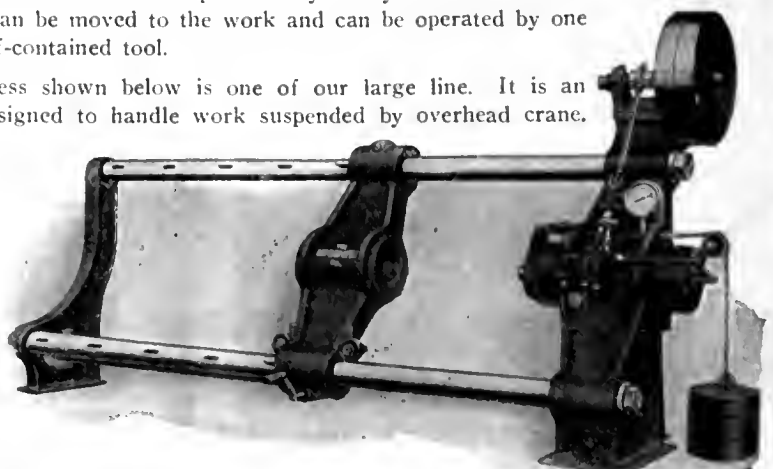
## HYDRAULIC MACHINERY For Shop Repairs

Labor Saving—Efficient—Economical

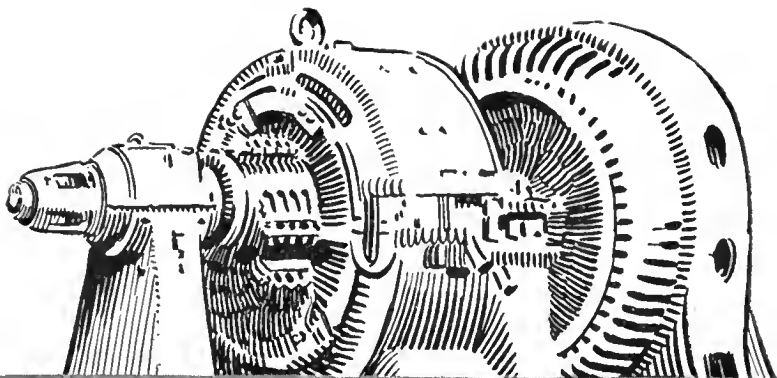
Here are two hydraulic machines especially designed for electric railway shop use; for assembling armatures, forcing gears; force fitting parts, assembling springs, forcing on and off wheels, bending, straightening, etc.

The 90-ton press shown here is particularly handy on account of its portability. It can be moved to the work and can be operated by one man—it is a self-contained tool.

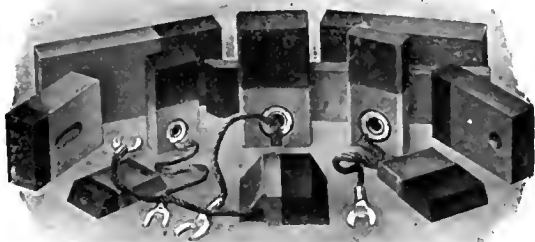
The wheel press shown below is one of our large line. It is an inclined type designed to handle work suspended by overhead crane.



100-Ton Inclined Wheel Press



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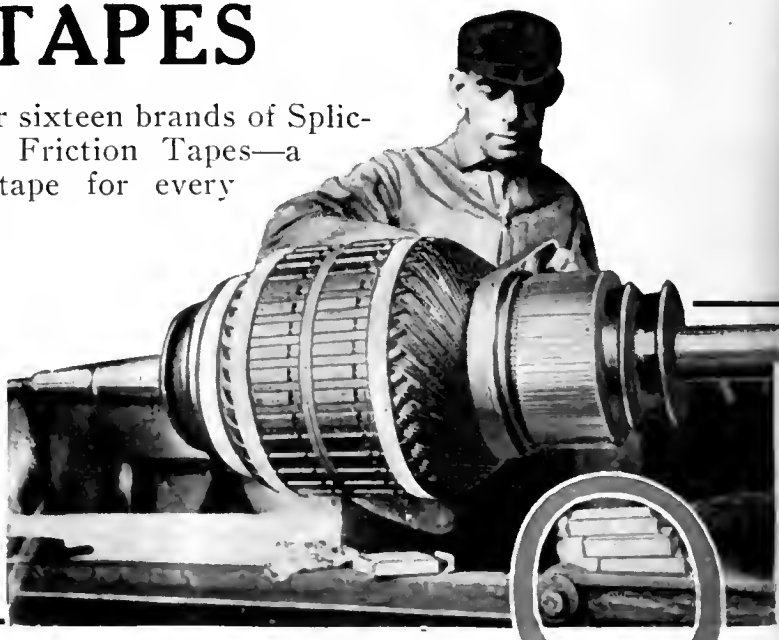
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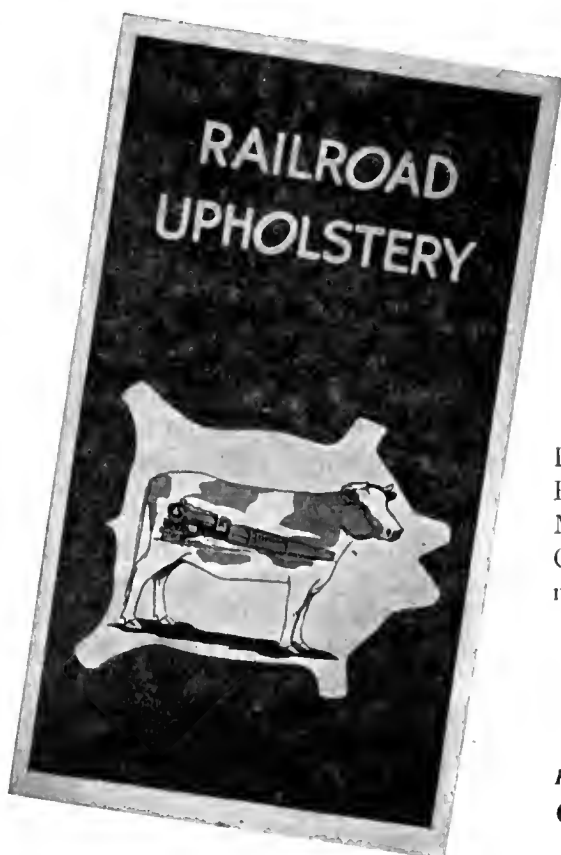
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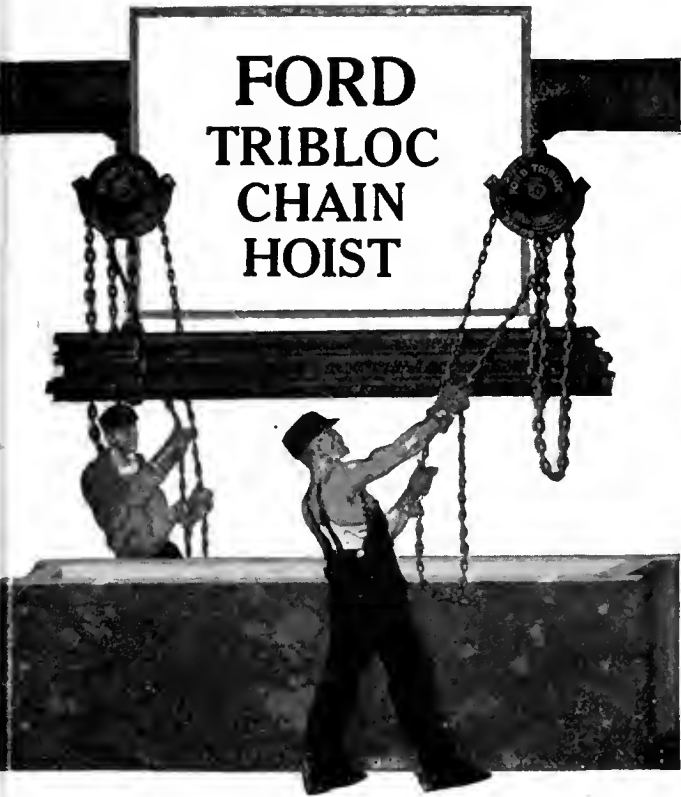
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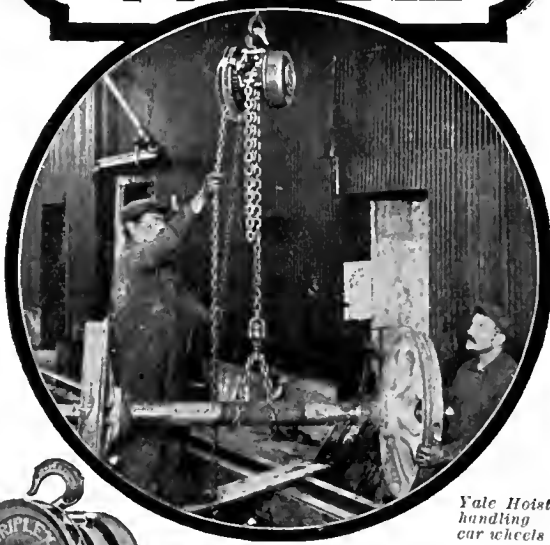
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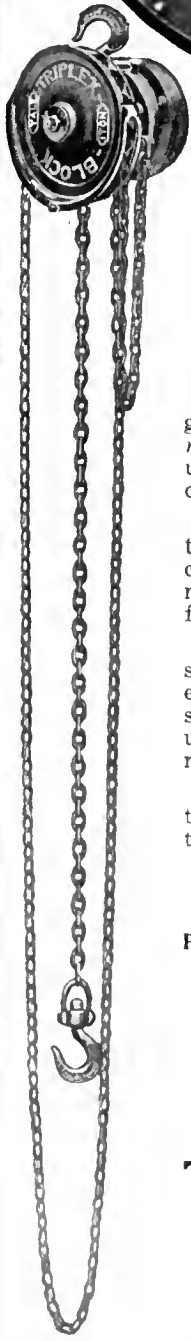
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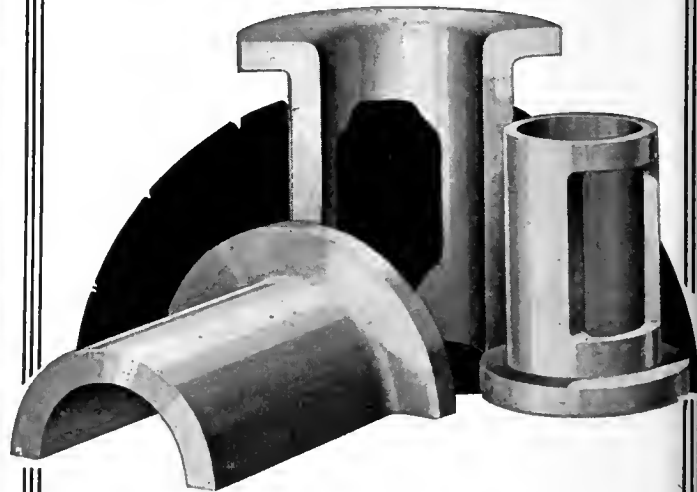
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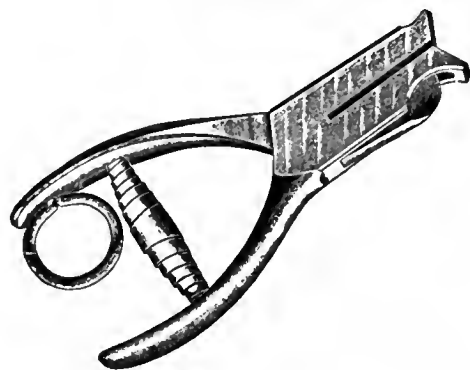
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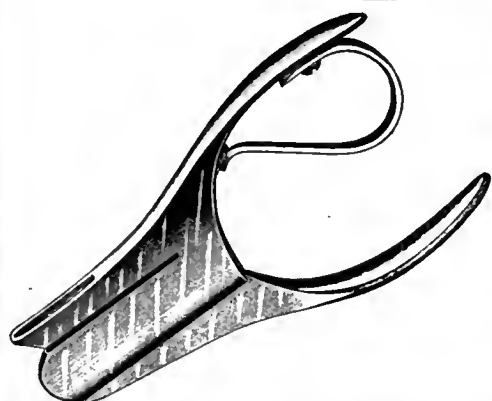
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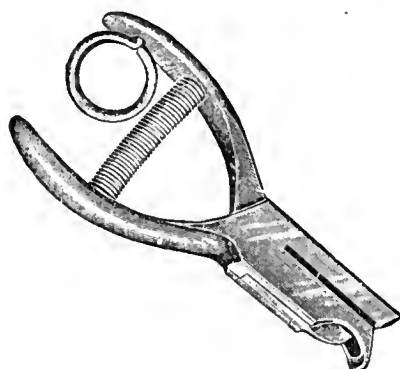
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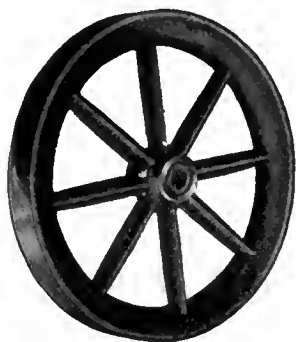
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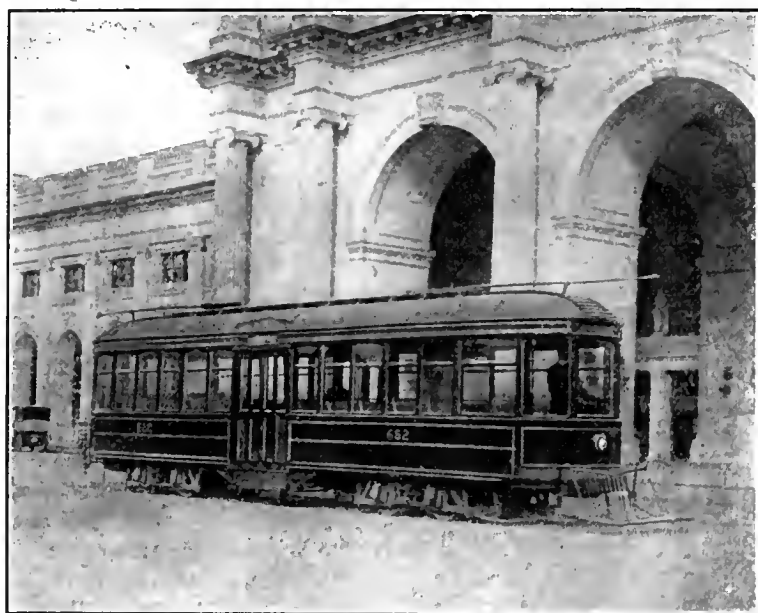
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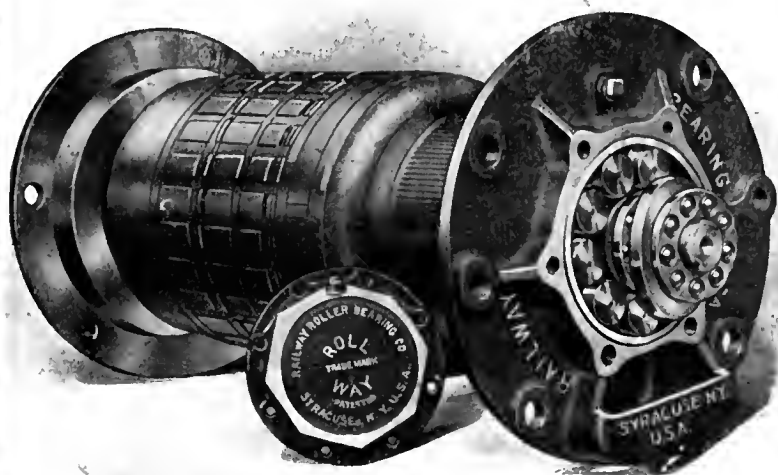
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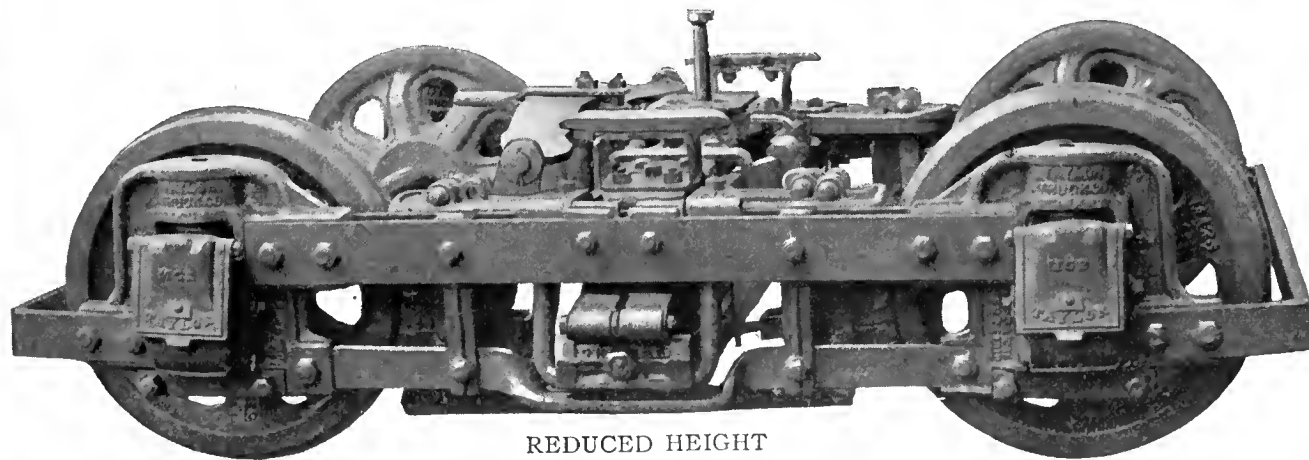
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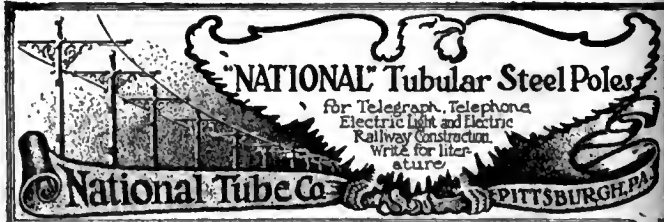
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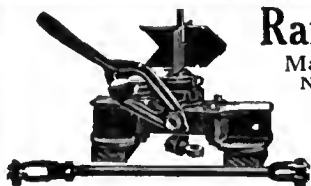
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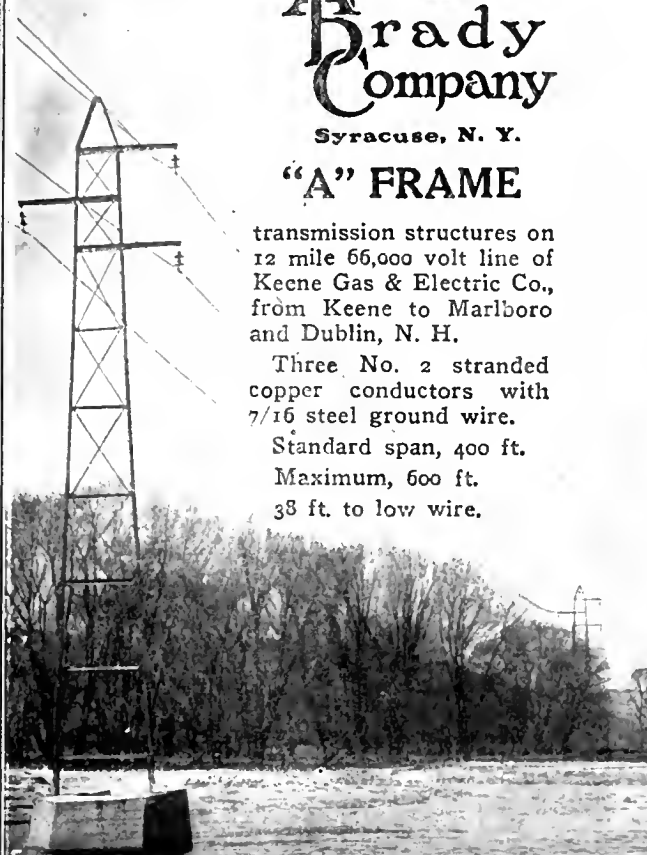
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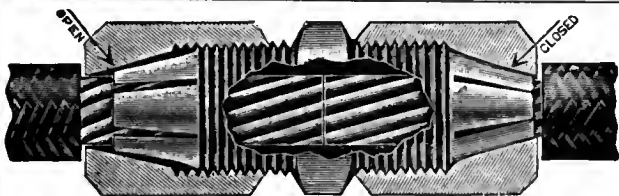
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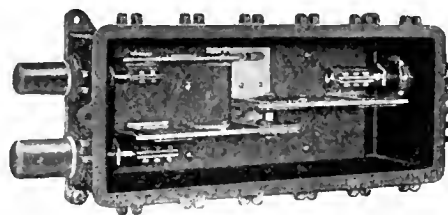
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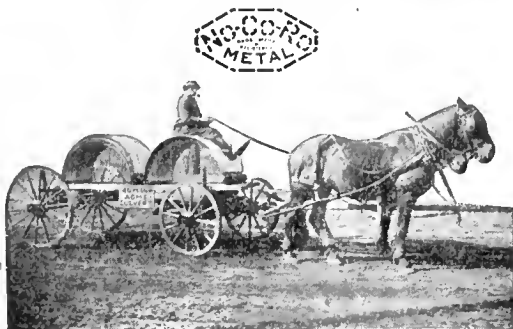
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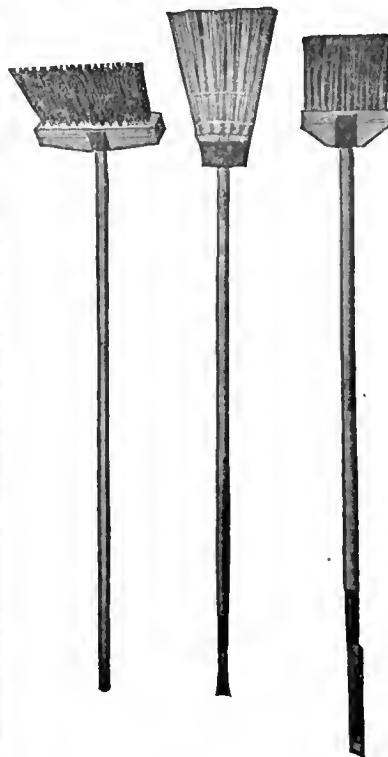
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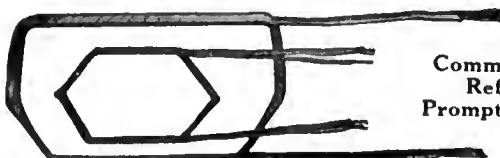


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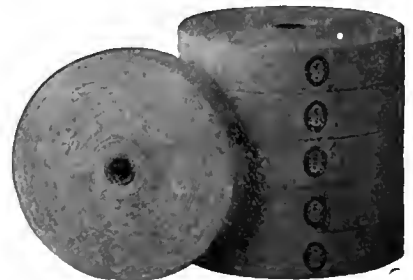
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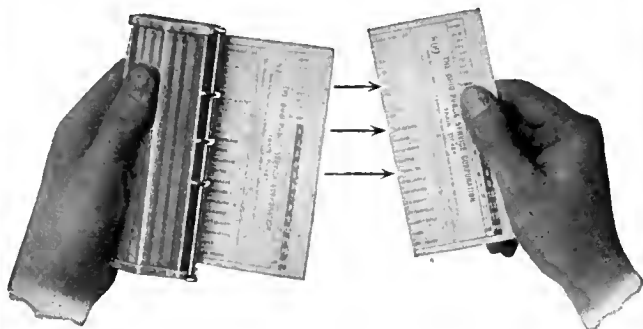
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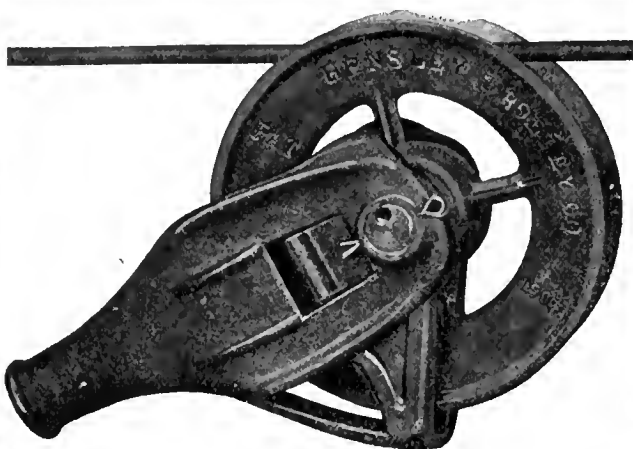
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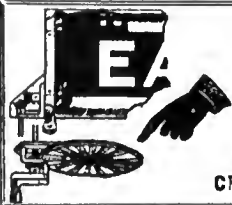
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are truly frictionless. The roller instead of turning on a pin rolls freely like a rolling pin.

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200 K.W., 550 to 600 V., 60 Cyc. Switch-board panels for A.C. and D.C. and Transformers for 2300 V. 1<sup>st</sup> fl.

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Alteration 3000 single phase O. I. S. C.  
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Serial No. 116334, Elec. Spec. No. 15430.  
Serial No. 116335, Elec. Spec. No. 15430.

These transformers in use about 8 years. In first-class, perfect condition.

**THE STARK ELECTRIC RAILROAD CO.**  
ALLIANCE, OHIO



## Railway Motors

Ten Westinghouse No. 306 Railway Motors, Type CA.

Eight Westinghouse No. 317-A-2 Railway Motors with gears and pinions, ratio 21:68, 6-in. axle bearings, complete with double-end ALF control.

Four Westinghouse No. 317-A with gears and pinions, ratio 21:68, 6-in. axle bearings.

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Three 300-kw. General Electric Type TC Rotary Converters, 3 phase, 60 cycle, 6 pole, 600/1200 volts d.c., 379 volts a.c., 1200 r.p.m.

Three 300-kw. General Electric 3-phase Transformers, oil cooled, 12,000/24,000 volts primary, 370 volts secondary, with four 2½ per cent reduced-capacity taps in primary and 50 per cent starting tap in secondary.

Complete switchboard equipment.

*We have on hand all classes of Power Machinery*

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- 100 tons 7" 70-lb. Shanghai Relayers.
- 125 tons 9" 90-lb. Girder Rails.
- 500 tons 100 lbs. with angles. New.

Full stock all weights.

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- 7—30 ft. 8 in. P. A. Y. E. type, Brill 21-E. single trucks, seat 32 persons. **First class.**
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All equipped with G. E. No. 80 motors, 550-600 volts.

**ZELNICKER IN ST. LOUIS**

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General Electric Co.

### SYNCHRONOUS CONVERTER #130,724

Type H.C.—12—500—600, Form P., Amperes 909, Volts 550.

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Type OT—67—75/  
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Cycles 60, K.V.A. 75.

416 Amperes per phase, 60 volts per phase.

For 430 Volt circuit.

### TRANSFORMERS—Single Phase

Type O.C.—Form B-1.  
60 cycles—185 K.W.  
Volts 10,000/410.

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Gas & Electric Co.  
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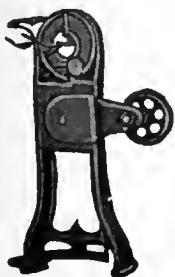
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## Railroad Track Scale

Fairbanks No. 4318—38-ft. platform and 50 tons capacity, in excellent condition, only used a short time. Also a lot of new set screws, tap screws, square iron, round iron, hexagon round and square bronze, brass tubing, antimony, core nails, flat rivets and tool steel.

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Pascagoula, Miss.



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Saves Time,  
Labor and Money

A boy can tape 40 coils for Westinghouse 12A Armature in an hour. Further particulars gladly furnished.

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## Everything in the Line of Repairs to Electrical Machinery

Complete Armatures, New Armatures, Rewound Armature Cores, Armature Shafts, Armature Coils, Fields and Commutators.

Established 22 Years.

## Direct Current Belted Generator

1—500 KW., 550 V., 320 RPM., Cp. Wd. Westinghouse 3 bearing direct current generator.

**DUQUESNE**  
Electric & Mfg Co.

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Equipment, Apparatus and Supplies Used by the Electric Railway Industry  
with Names of Manufacturers and Distributors

**Acetylene Service and Apparatus.**  
Oxweld Acetylene Co.

**Advertising, Street Car.**  
Collier, Inc., Barron, G.

**Air Cleaners.**  
Horne Mfg. Co.

**Air Rectifiers.**  
Holden & White, Inc.

**Alloys, Steel & Iron**  
(See also Bearings and Bearing Metals.)  
Titanium Alloy Mfg. Co.

**Anchor, Guy.**  
Electric Service Supplies Co.  
Holden & White, Inc.  
Ohio Brass Co.  
Western Electric Co.  
Westinghouse Elec. & M. Co.

**Anti-Climbers.**  
Railway Improv. Co.

**Automobiles and Buses.**  
Brill Co., The J. G.

**Axle Straighteners.**  
Columbia M. W. & M. I. Co.

**Axles.**  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Carnegie Steel Co.  
McGuire-Cummings Mfg. Co.  
National Railway Appliance Co.  
St. Louis Car Co.  
Standard Steel Works Co.  
Taylor Electric Truck Co.  
Westinghouse Elec. & M. Co.

**Babbittin' Devices.**  
Columbia M. W. & M. I. Co.

**Badges and Buttons.**  
American Railway Supply Co.  
Electric Service Supplies Co.  
International Register Co., The.  
Woodman Mfg. & Supply Co., R.

**Bankers and Brokers.**  
Coal & Iron National Bank.

**Batteries, Dry.**  
John-Manville Co., H. W.

**Batteries, Storage.**  
Electric Storage Battery Co.

**Bearings and Bearing Metals.**  
Ajax Metal Co.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
General Electric Co.  
More-Jones Brass & M. Co.  
St. Louis Car Co.  
Taylor Elec. Truck Co.  
Westinghouse Elec. & M. Co.

**Bearings, Center and Roller Side.**  
Baldwin Locomotive Works.  
Holden & White, Inc.  
Stuckl Co., A.

**Bearings, Oil-less, Graphite, Bronze and Wood.**  
Bound Brook Oil-less Bearing Co.

**Bearings, Roller and Ball.**  
Gurney Ball Bearing Co.  
Railway Roller Bearing Co.

**Bells and Gongs.**  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
St. Louis Car Co.

**Benders, Rail.**  
Niles-Bement-Pond Co.  
Watson-Stillman Co.  
Zelnicker Supply Co., W. A.

**Blasting Powder & Equipment.**  
Du Pont de Nemours Co., E. I.

**Boiler Cleaning Compounds.**  
Dearborn Chemical Co.  
John-Manville Co., H. W.

**Boiler Coverings.**  
John-Manville Co., H. W.

**Boiler Graphite.**  
Dixon Crucible Co., Joseph.

**Boiler Tubes.**  
National Tube Co.

**Boilers.**  
Babcock & Wilcox Co.

**Bond Testers.**  
American Steel & Wire Co.

**Bonding Apparatus.**  
Electric Railway Improv. Co.  
Lincoln Bonding Co.  
Ohio Brass Co.  
Oxweld Acetylene Co.

**Bonding Tools.**  
American Steel & Wire Co.  
Electric Railway Improv. Co.  
Electric Service Supplies Co.  
Ohio Brass Co.

**Bonds, Rail.**  
American Steel & Wire Co.  
Electric Railway Improv. Co.  
Electric Service Supplies Co.  
General Electric Co.  
John-Manville Co., H. W.  
Lincoln Bonding Co.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

**Book Publishers.**  
McGraw-Hill Book Co., Inc.

**Boring Tools, Car Wheel.**  
Niles-Bement-Pond Co.

**Braces, Rail.**  
Kilby Frog & Switch Co.

**Brackets and Cross Arms.**  
(See also Poles, Ties, Posts, Piling and Lumber.)  
Bates Expanded Steel Truss Co.  
Crenghead Engrg. Co.  
Electric Railway Equipment Co.  
Electric Service Supplies Co.  
Hubbard & Co.  
Lindsley Bros. Co.  
Ohio Brass Co.

**Brake Adjusters.**  
Holden & White, Inc.

**Brake Shoes.**  
American Brake S. & Fdy. Co.  
Barbour-Stockwell Co.  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
McGuire-Cummings Mfg. Co.  
St. Louis Car Co.  
Taylor Elec. Truck Co.  
Wheel Truing Brakeshoe Co.

**Brakes, Brake Systems and Brake Parts.**  
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Brill Co., The J. G.  
Br. Westinghouse Elec. & Mfg. Co.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Holden & White, Inc.  
Horne Mfg. Co.  
McGuire-Cummings Mfg. Co.  
National Brake Co.  
St. Louis Car Co.  
Safety Car Devices Co.  
Taylor Elec. Truck Co.  
Westinghouse Trac. Brake Co.

**Brooms, Track, Steel or Lattan.**  
Paxson Co., J. W.  
Zelnicker Supply Co., W. A.

**Brushes, Carbon.**  
American Carbon & Battery Co.  
General Electric Co.  
Jeandron, W. J.  
Morgan Crucible Co.  
United States Graphite Co.  
Westinghouse Elec. & M. Co.

**Brushes, Graphite.**  
Dixon Crucible Co., Jos.  
United States Graphite Co.

**Brush Holders.**  
Anderson Mfg. Co., A. & J. M.  
Eureka Co.

**Bushings, Case Hardened Manganese.**  
Bemis Car Truck Co.

**Bushings, Fibre.**  
Diamond State Fibre Co.

**Bushings, Graphite & Wooden.**  
Bound Brook Oil-less Bearing Co.

**Cables.**  
(See Wires and Cables.)

**Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)**

**Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)**

**Cars, Oil-Electric.**  
Electric Car & Loco. Corp.

**Cars, Passengers, Freight, Express, etc.**  
American Car Co.  
Brill Co., The J. G.  
Kuhlman Car Co., G. C.  
McGuire-Cummings Mfg. Co.  
St. Louis Car Co.  
Wason Mfg. Co.

**Cars, Second Hand.**  
Electric Equipment Co.  
Kerschner Co., Inc., W. R.

**Cars, Self-Propelled.**  
Br. Westinghouse Elec. & Mfg. Co.  
Electric Storage Battery Co.  
General Electric Co.

**Castings, Brass, Composition or Copper.**  
Anderson M. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
Frankel Connector Co.  
Horne Mfg. Co.  
More-Jones Brass & M. Co.

**Castings, Gray Iron & Steel.**  
American B. S. & Fdry. Co.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Horne Mfg. Co.  
St. Louis Car Co.  
Standard Steel Works Co.  
Union Sprig & Mfg. Co.

**Castings, Malleable and Brass.**  
American Brake S. & Fdry. Co.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Horne Mfg. Co.  
St. Louis Car Co.

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Electric Service Supplies Co.  
Holden & White, Inc.  
Horne Mfg. Co.  
Ohio Brass Co.  
Trolley Supply Co.  
Wood Co., C. N.

**Celling, Car.**  
Keyes Products Co.  
Pantasote Co.

**Certified Public Accountant.**  
Swan, James T.

**Checks, Employees.**  
American Railway Supply Co.

**Chemists.**  
Little, Inc., Arthur D.

**Circuit Breakers.**  
General Electric Co.  
Westinghouse Elec. & M. Co.

**Clamps and Connectors, for Wires and Cables.**  
Anderson Mfg. Co., A. & J. M.  
Electric Service Supplies Co.  
Frankel Connector Co.  
General Electric Co.  
Hubbard & Co.  
Klein & Sons, M.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

**Cleaners & Scrapers, Track (See also Snow-Plows, Sweepers and Brooms.)**  
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McGuire-Cummings Mfg. Co.  
Ohio Brass Co.  
Root Spring Scraper Co.

**Clusters and Sockets.**  
General Electric Co.

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**Coasting Recorders.**  
Railway Improv. Co.

**Coil Banding and Winding Machines.**  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.

**Coils, Armature and Field.**  
Cleveland Armature Works.  
Coll Mfg. & Repair Co.  
Columbia M. W. & M. I. Co.  
D & W Fuse Co.  
General Electric Co.  
Independent Lamp & Wire Co.  
Westinghouse Elec. & M. Co.

**Coils, Choke and Kicking.**  
Electric Service Supplies Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.

**Coin-Counting Machines.**  
Electric Service Supplies Co.  
International Register Co.

**Commutator Slotters.**  
Electric Service Supplies Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.  
Wood Co., C. N.

**Commutator Slotting Files.**  
Handy Supply Co.

**Commutator Stones.**  
Handy Supply Co.

**Commutator Truing Devices.**  
General Electric Co.

**Commutators or Parts.**  
Cameron Elec'l Mfg. Co.  
Cleveland Armature Works.  
Coll Mfg. & Repair Co.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
General Electric Co.  
Mica Insulator Co.  
Westinghouse Elec. & M. Co.

**Compressors, Air.**  
General Electric Co.  
Westinghouse Trac. Brake Co.

**Condensers.**  
General Electric Co.  
Westinghouse Elec. & M. Co.

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John-Manville Co., H. W.  
Standard Underground Cable Co.

**Connectors, Solderless.**  
Frankel Connector Co.

**Controller Regulators.**  
Electric Service Supplies Co.

**Controllers or Parts.**  
Br. Westinghouse Elec. & Mfg. Co.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Horne Mfg. Co.  
John-Manville Co., H. W.  
Westinghouse Elec. & M. Co.

**Controlling Systems.**  
General Electric Co.  
Westinghouse Elec. & M. Co.

**Converters, Rotary.**  
General Electric Co.  
Westinghouse Elec. & M. Co.

**Conveying and Hoisting Machinery.**  
Columbia M. W. & M. I. Co.  
Green Eng'g Co.

**Cord, Bell, Trolley, Register, etc.**  
Brill Co., The J. G.  
Electric Service Supplies Co.  
International Register Co., The.  
Rebollar's Sons Co., John A.  
Samson Cordage Works.  
Trolley Supply Co.

**Cord Connectors and Couplers.**  
Electric Service Supplies Co.  
Samson Cordage Works.  
Wood Co., C. N.

**Couplers, Car.**  
Brill Co., The J. G.  
McGuire-Cummings Mfg. Co.  
Ohio Brass Co.  
Van Dorn Coupler Co.  
Westinghouse Trac. Brake Co.

**Couplings, Conduit.**  
Horne Mfg. Co.

**Cranes. (See also Hoists.)**  
Niles-Bement-Pond Co.

**Crossing. (See Wood Preservatives.)**

**Cross Arms. (See Brackets.)**

**Crossing Foundations.**  
Balkwill Manganese Crossing Co.  
International Steel Tie Co.

**Crossing Signals. (See Signals, Crossing.)**

**Crossings, Track. (See Track, Special Work.)**

**Culverts.**  
American Rolling Mill Co.  
Bark River B. & Culvert Co.  
California Cor. Culvert Co.  
Canada Ingot Iron Co., Ltd.  
Canton Culvert & Silo Co.  
Coast Culvert & Flume Co.  
Corrugated Culvert Co.  
Delaware Metal Culvert Co.  
Dixie Culvert & Metal Co.  
Hardesty Mfg. Co., R.  
Illinois Corrugated Metal Co.  
Iowa Pure Iron Culvert Co.  
Kentucky Culvert Mfg. Co.





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One of the Portable Electrodynamometer Group, which also includes Model 310 Single Phase and D.C. Wattmeter, Model 329 Polyphase Wattmeter and Model 341 A.C. and D.C. Voltmeter.

The characteristics of the group are extreme accuracy (guaranteed within a fraction of 1% full scale value), adaptability for use on circuits of any commercial frequency and any wave form, great overload capacity, low moment of inertia, effective damping and shielding, and the legibility and remarkable uniformity of the hand calibrated scales.

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# Weston

## Indicating Instruments

In design, in material, in their structural perfection, they are thoroughly worthy to represent Weston ideas and ideals in the field of active service.

Weston Indicating Instruments include a great variety of groups for portable or switchboard service on A. C. or D. C. Circuits, Instruments designed expressly for testing and laboratory use, for motor car and boat electrical systems, and many others for special purposes. Write for Bulletins or Catalogs describing those which interest you.

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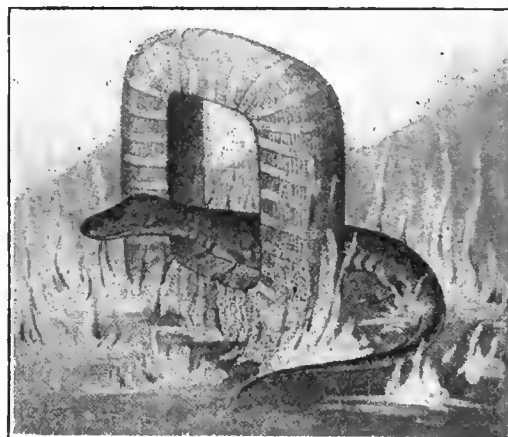
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Don't let LABOR SHORTAGE hold them up in your coil department. You can't get more men—but you can save time and money by sending the coils to us for re-insulation with

## SALAMANDER Pure Asbestos

We will return them promptly—better insulated and more durable than when new.

"Salamander" asbestos wire excels in insulating value and cannot burn out under the severest overload. Leading electric railways are our best customers. Write us for details now.

## Independent Lamp & Wire Co., Inc.

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New England Metal Cul. Co.  
North East Metal Co.  
Northwestern Sheet & I. Wks.  
O'Neill Co., W. Q.  
Ohio Corrugated Culvert Co.  
Pennsylvania Metal Cul. Co.  
Road Supply & Metal Co.  
Sioux Falls Metal Cul. Co.  
Spokane Cul. & Tank Co.  
Tennessee Metal Culvert Co.  
Utah Corr. Cul. & Flume Co.  
Virginia Metal & Culvert Co.  
Western Metal Mfg. Co.  
Wyatt Mfg. Co.

**Curtains and Curtain Fix-  
tures.**  
Brill Co., The J. G.  
Du Pont Fabrikoid Co.  
Electric Service Supplies Co.  
Hartshorn Company, Stewart.  
Pantasote Co., The.  
St. Louis Car Co.

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Acetylene.**  
Oxweld Acetylene Co.

**Derailing Devices.**  
Cleveland Frog & Crossing Co.

**Destination Signs.**  
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Creaghead Engrg. Co.  
Electric Service Supplies Co.

**Detective Service.**  
Wisch Service, P. Edward.

**Door Operating Devices.**  
Consolidated Car Heating Co.  
National Pneumatic Co.  
Safety Car Devices Co.

**Doors, Asbestos.**  
Johns-Manville Co., H. W.

**Doors and Door Fixtures.**  
Brill Co., The J. G.  
Hale & Kilburn Co.

**Doors, Folding Vestibule.**  
National Pneumatic Co.

**Draft Rigging. (See Comp-  
lers, Car.)**

**Drills, Track.**  
American Steel & Wire Co.  
Electric Service Supplies Co.  
Long Co., E. G.  
Niles-Bement-Pond Co.  
Ohio Brass Co.

**Dryers, Sand.**  
Electric Service Supplies Co.  
Zelnicker Supply Co., W. A.

**Engineers, Consulting, Con-  
tracting and Operating.**  
Archbold-Brady Co.  
Arnold Co., The.  
Beeler, John A.  
Byllesby & Co., H. M.  
Ford, Bacon & Davis.  
Jackson, D. C. & Wm. B.  
Richey, Albert S.  
Sanderson & Porter.  
Sargent & Landy.  
Seaford Engineering Co.  
Slone, Huddle, Feustel & Freeman.  
Stone & Webster.  
White Companies, The J. G.  
Woodmansee & Davidson Engineer-  
ing Co.

**Engines, Gas and Oil.**  
Westinghouse Elec. & M. Co.

**Engines, Steam.**  
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Cleveland Fare Box Co.  
International Register Co., The.  
National Railway Appliance Co.  
Ohmer Fare Register Co.

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American Steel & Wire Co.  
Page Steel & Wire Co.

**Fenders and Wheel Guards.**  
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Cleveland Fare Box Co.  
Consolidated Car Fender Co.  
Electric Service Supplies Co.  
Root Spring Scraper Co.  
Star Brass Works.  
Trolley Supply Co.  
Wood Co., Charles N.

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Diamond State Fibre Co.  
Johns-Manville Co., H. W.  
Westinghouse Elec. & M. Co.

**Field Coils. (See Coils.)**

**Filters, Water.**  
Seafie & Sons Co., Wm. B.

**Fire Extinguishing Appa-  
ratus.**  
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Johns-Manville Co., H. W.

**Floodlights.**  
Crouse-Hinds Co.  
Electric Service Supplies Co.

**Flooring, Composition.**  
American Mason Safety T. Co.  
Johns-Manville Co., H. W.

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Eureka Co.  
Standard Steel Works Co.

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Chicago Fuse Mfg. Co.  
Columbia M. W. & M. I. Co.  
D & W Fuse Co.  
General Electric Co.  
Johns-Manville Co., H. W.  
Westinghouse Elec. & M. Co.

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Columbia M. W. & M. I. Co.  
General Electric Co.  
Horne Mfg. Co.

**Gages, Oil and Water.**  
Ohio Brass Co.

**Gaskets.**  
Diamond State Fibre Co.  
Johns-Manville Co., H. W.  
Power Specialty Co.

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General Electric Co.

**Gas Producers.**  
Westinghouse Elec. & M. Co.

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Brill Co., The J. G.

**Gear Blanks.**  
Carnegie Steel Co.  
Diamond State Fibre Co.  
Standard Steel Wks. Co.

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Electric Service Supplies Co.  
Westinghouse Elec. & M. Co.

**Gears and Pinions.**  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Diamond State Fibre Co.  
Electric Service Supplies Co.  
General Electric Co.  
National Ry. Appliance Co.  
Nuttall Co., R. D.

**Generating Sets, Gas-Elec-  
tric.**  
General Electric Co.

**Generators.**  
Dick, Kerr & Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.

**Gongs. (See Bells and  
Gongs.)**

**Graphite.**  
Dixon Crucible Co., Joseph.  
Morgan Crucible Co.

**Grates, Chain.**  
Green Eng'g Co.

**Greases. (See Lubricants.)**

**Grinders and Grinding Sup-  
plies.**  
Goldschmidt Thernit Co.  
Indianapolis Switch & Frog Co.  
Railway Track-work Co.

**Guards, Trolley.**  
Electric Service Supplies Co.  
Ohio Brass Co.

**Harps, Trolley.**  
Anderson M. Co., A. & J. M.  
Electric Service Supplies Co.  
Hensley Trolley & Mfg. Co.  
More-Jones Brass & M. Co.  
Nuttall Co., R. D.  
Star Brass Works.  
Western Electric Co.

**Headlights.**  
Crouse-Hinds Co.  
Electric Service Supplies Co.  
General Electric Co.  
Ohio Brass Co.  
St. Louis Car Co.  
Trolley Supply Co.

**Headlinings.**  
Keyes Products Co.  
Pantasote Co., The.

**Heaters, Car, Electric.**  
Consolidated Car Heating Co.  
Gold Car Heating & Lighting Co.  
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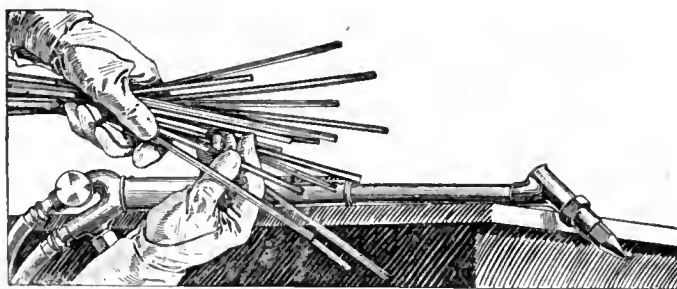
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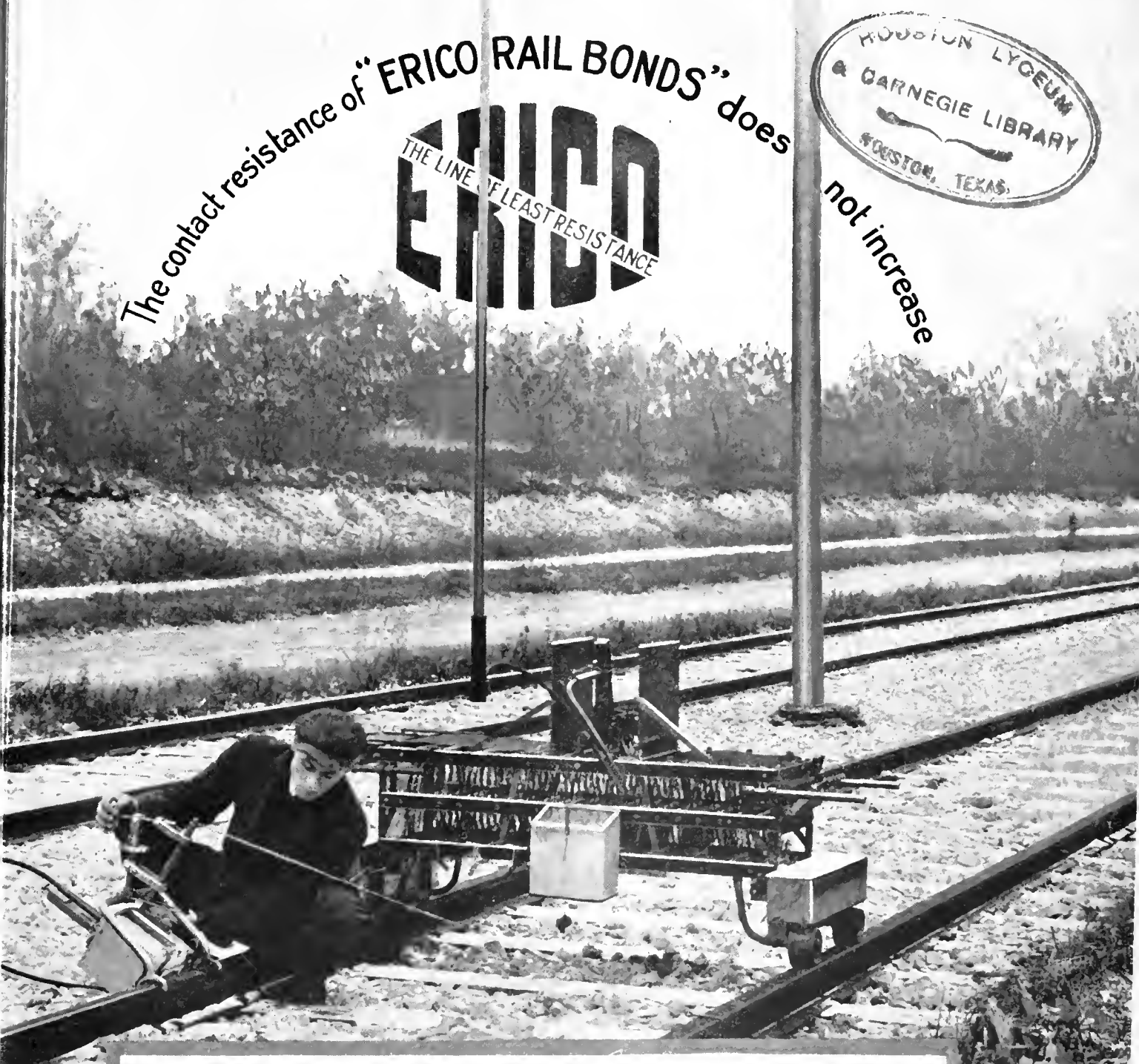
# ELECTRIC RAILWAY JOURNAL

New York, March 9, 1918

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Vol. 51, No. 10

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## The ERICO Portable Welder

For Electric Weld Rail Bonding and  
General Arc Welding Work

Weight—Rheostat 140 lbs., Welder 65 lbs.

Full details on request.

The Electric Railway Improvement Co.

Cleveland



# ROCHESTER and the GE-258

The GE-258 is not only the leading motor for the Light-Weight Safety Car but is also a big factor in the equipment of the latest type large capacity car because it is so well adapted to the low-floor, low-truck design which facilitates quick passenger movement.

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on the New York State Railways—Rochester Lines—are among the many of low-floor design that have already been equipped with four GE-258 ball-bearing, self-ventilated motors.

The successful operation of the first fifty equipments in Rochester was followed by a second order for 25 additional equipments, making a total of 300 GE-258 motors now in operation in Rochester.

7470



# General Electric Company

General Offices  
Schenectady, N. Y.



Sales Offices

Power Distribution for Montreal Tramways

# ELECTRIC RAILWAY JOURNAL

New York, March 9, 1918

McGraw-Hill Company, Inc.

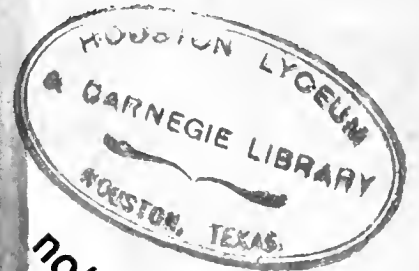
Vol. 51, No. 10

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The contact resistance of "ERICO RAIL BONDS" does

**ERICO**

THE LINE OF LEAST RESISTANCE



not increase



## The ERICO Portable Welder

For Electric Weld Rail Bonding and  
General Arc Welding Work

Weight—Rheostat 140 lbs., Welder 65 lbs. Full details on request.

The Electric Railway Improvement Co.

Cleveland



## Electric Railway Transportation

### General Manager:

In your business of running an electric railway do you think as a broad-gauged transportation man, or do you think of passenger transportation only?

Many electric railways are making a financial success of freight haulage.

Have you **carefully** and **honestly** analyzed your road and the people and territory served?

Have you analyzed the industrial activity, farming and merchandising from a transportation standpoint? If not, you have failed in your duty to yourself, your position and your stockholders.

Stop and consider this carefully. The freight-haulage question is before the country as never before. You must be sure you know the facts about your own road.

W. S. R.

**Westinghouse Electric & Manufacturing Company**

East Pittsburgh



Pennsylvania

# Electric Railway Journal

H. W. BLAKE, Editor

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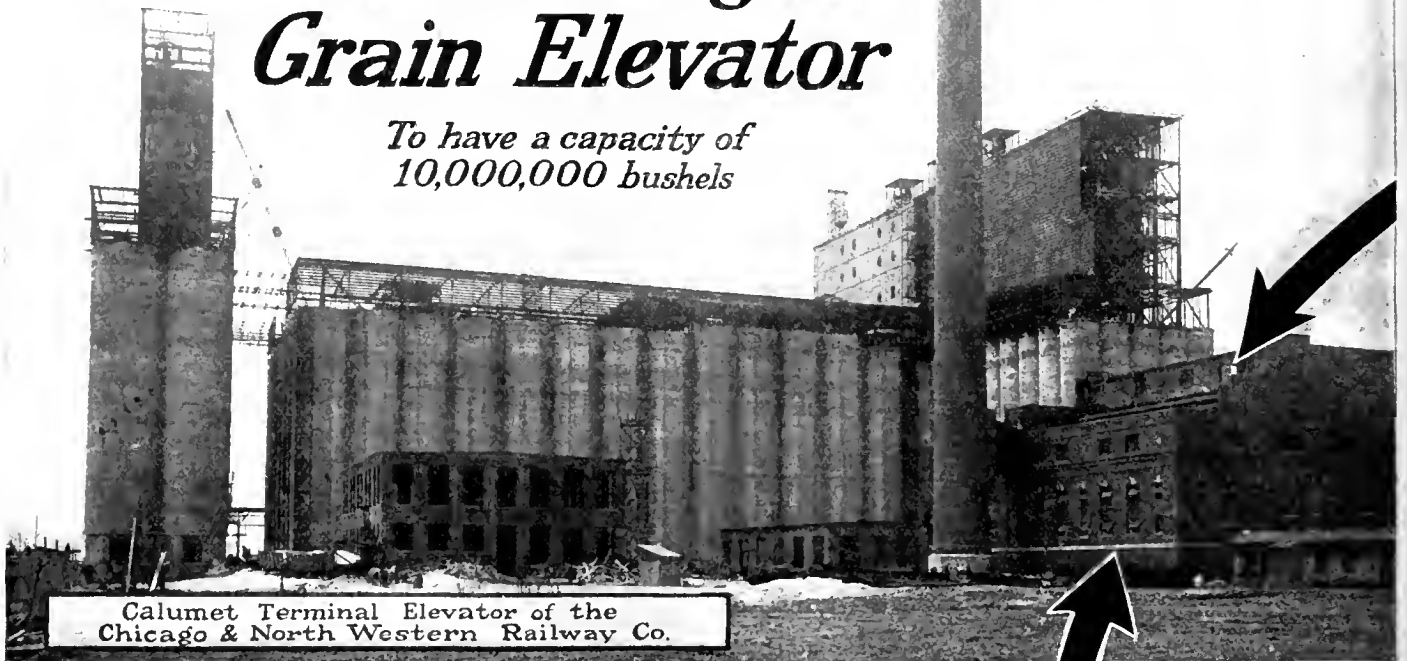
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# *The Worlds Largest Grain Elevator*

*To have a capacity of  
10,000,000 bushels*



Calumet Terminal Elevator of the  
Chicago & North Western Railway Co.

# Westinghouse

## *Underfeed Stokers*

*Burn  
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Satisfactorily*





## Air Distribution

By means of a simple arrangement of dampers air is admitted to all parts of the fuel bed of the Westinghouse Underfeed Stoker in just the right proportions for the highest obtainable combustion efficiency.

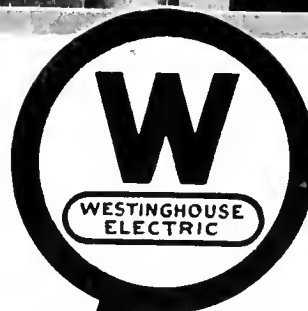
In the vast Calumet terminal elevator was put the best in design and materials that engineering skill could devise—to make it in every respect the most modern, as well as the largest in existence today.

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The selection of the Westinghouse Underfeed Stoker, which burns a wide variety of fuels satisfactorily, is a *precaution of inestimable value today.*

*Are you prepared for the emergency?*

**Westinghouse Electric & Mfg. Co.**  
East Pittsburgh, Pa.



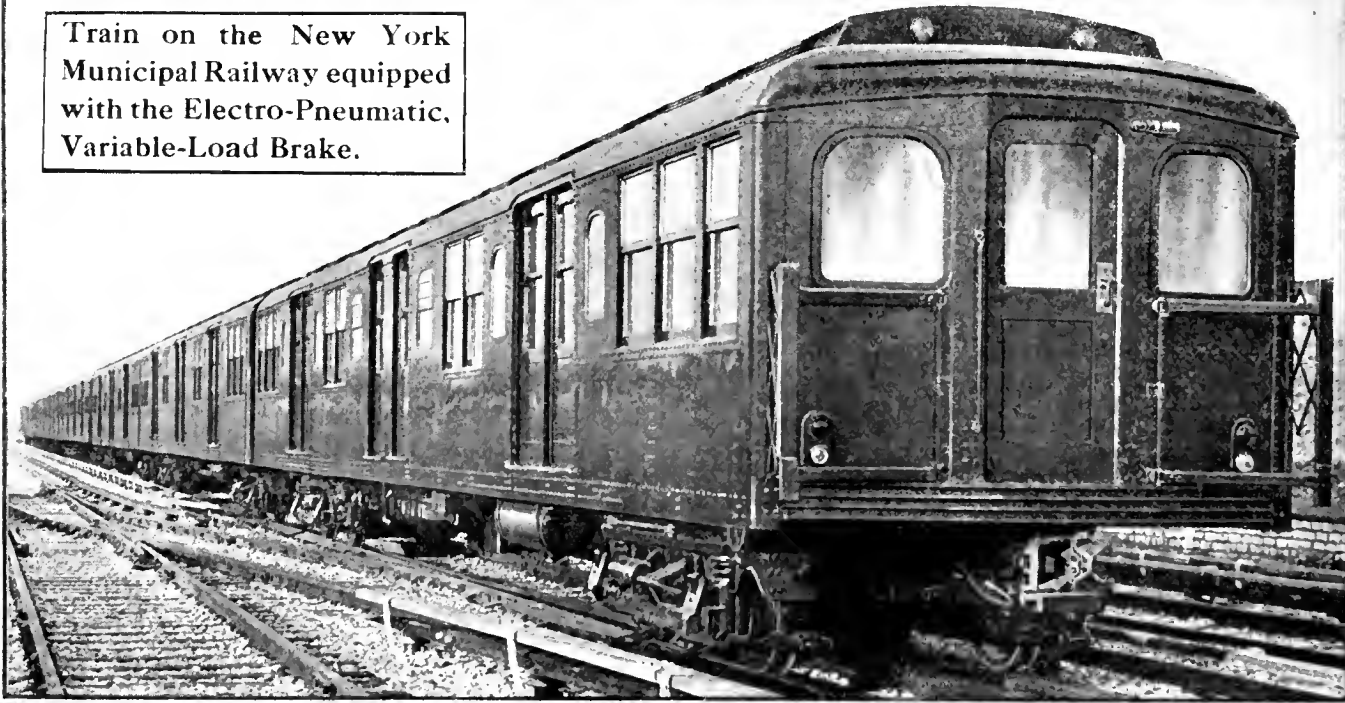
## Fuels

The Westinghouse Underfeed Stoker will burn satisfactorily many different fuels, ranging from high-volatile Eastern to high-ash Western Coals and Lignite.

This Stoker is installed as far West as Wyoming, North to Minnesota, South to Louisiana and East to Massachusetts.

# The Electro-Pneumatic Variable-Load Brake

Train on the New York  
Municipal Railway equipped  
with the Electro-Pneumatic,  
Variable-Load Brake.



—automatically adjusts the braking power on the car to suit the load carried varying from minimum on an empty car to maximum when the car is fully loaded. The entrance of passengers to the car actuates the

adjusting mechanism and automatically increases the braking power. Similarly, the exit of passengers reduces the braking power. Hence a brake combining efficiency and safety in an unusual degree.

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## Electric Railway Journal

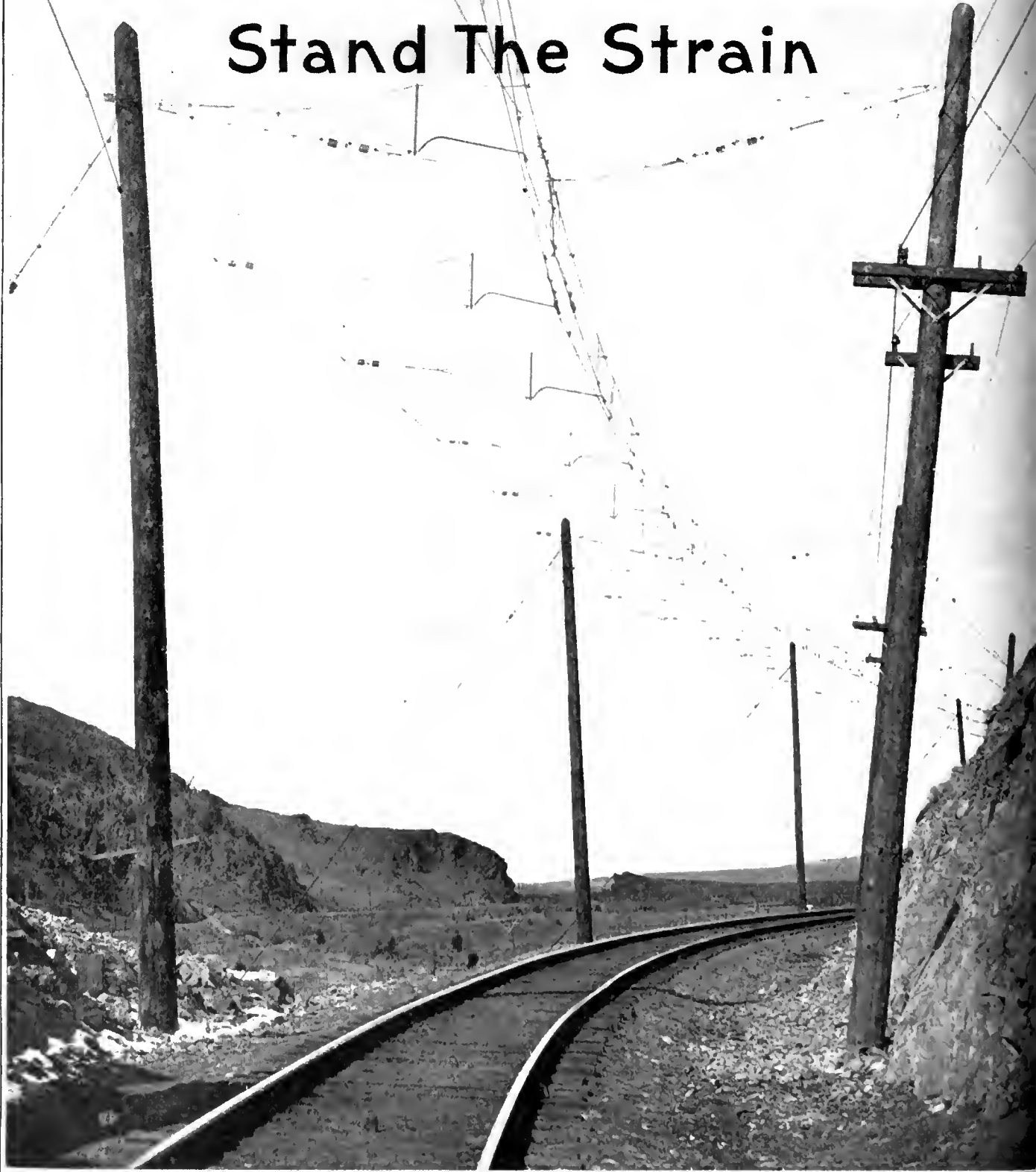
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# WESTERN RED CEDAR POLES

## Stand The Strain



Chicago, Milwaukee & St. Paul 3000 v. D.C. Electrification; 10 Degree Curve at the Western Entrance of Silver Bow Canyon. Showing Feeder Taps.

**Western Red Cedar Poles Give Long Service—Strong—Straight—Sightly**  
**Western Red Cedar Association** **Spokane, Wash.**



# PRODUCTS



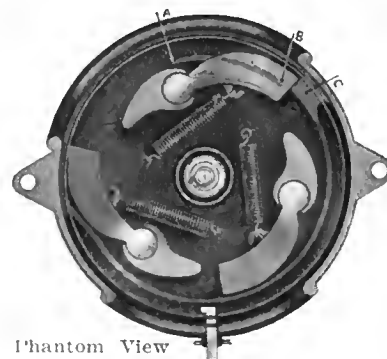
## O-B Trolley Catcher Has Positive Action

The pole cannot "step-up" when O-B Catchers are on the cars.

When the trolley wheel leaves the wire, dogs on the back of the rope reel are thrown outward by centrifugal force. One of them slides over the guide A-B and engages stop C (see illustration at right). A lug on the dog prevents the latter from returning to normal position till several inches of rope have been wound in.

The rebound is never sufficient to release the dog.

O-B Catchers have many other valuable characteristics. Ask about trial offer.



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is not phased  
by **REVERSE  
CURVES**



This reverse curve at Arguello (First) Avenue and Sacramento Street, San Francisco, is wired in No. 00 round Phono-Electric Trolley Wire.

Curves are nasty places for trolley wire wear. Only a tough, durable, uniform wire should be used at such locations if long, unbroken, economical service is wanted.

That tough durable and uniform wire for curves and other jobs is

**PHONO-ELECTRIC**

Bridgeport Brass Company  
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2068

# Wasted—

## 35% to 50% of TRACK MATERIAL

# INTERNATIONAL STEEL TWIN TIES

### Obviate this wasted material and labor

Of What Engineering Value is the Concrete or Ballast Between Wooden Ties? Absolutely None. It Represents an Economic Loss of Track Material and Labor

Steel Twin Ties are designed to overcome just that condition. The effective tie bearing area is placed at the top of the tie and parallel with the rail.

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Seven inches of concrete beneath the tie plate puts just that much in effective bearing. An inch more than is usually used. And at the same time the excavation and concrete quantities below base of rail are reduced one-half.

Any way you look at them they are engineeringly right. The longer you delay your purchase of some of these ties the more money you waste in extraneous track materials and labor.

Ask our users if you want our best sales argument. If you are convinced ask us for a quotation and delivery.

*Prompt deliveries made from stock*



Permanent Track at Less Cost  
Any Type Base — Open or Paved Track

## The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations  
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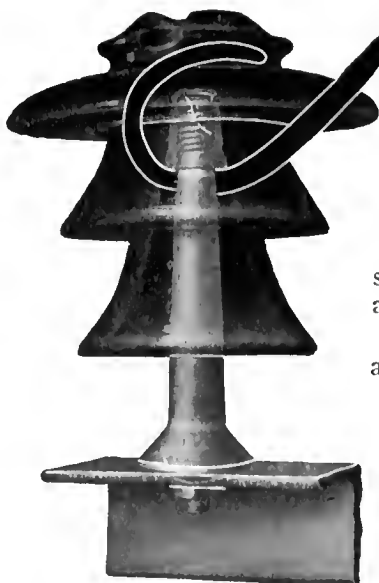
33,000 volt line on Bo-Arrow arms and Peirce Pins; 2200 volt primary on wood arms with Peirce clamp pins; 440 volt secondary on Peirce secondary racks. (Pittsburgh, Pa.)



One 33,000 volt line on Bo-Arrow arms and Peirce Forged Steel Pins. Two 33,000 volt lines on Steel Angle arms and Peirce pins. (Pittsburgh, Pa.)

## Bo-Arrow Steel Cross Arms and Peirce Pins

carry the lines of the Duquesne Light Co. of Pittsburgh, Pa., through a district where atmospheric conditions are the worst possible for line equipment.



The threads of the thimble fit loosely over the threads of the pin, and a thin cork disc is provided between the top of the pin and the thimble. Under expansion the pin simply rides up further in the thimble, the cork disc compressing. None of the strain is communicated to the insulator.

Peirce pins are guaranteed to stand strains equal to their rated strength with a deflection of less than 10 degrees, and without danger to the insulator.

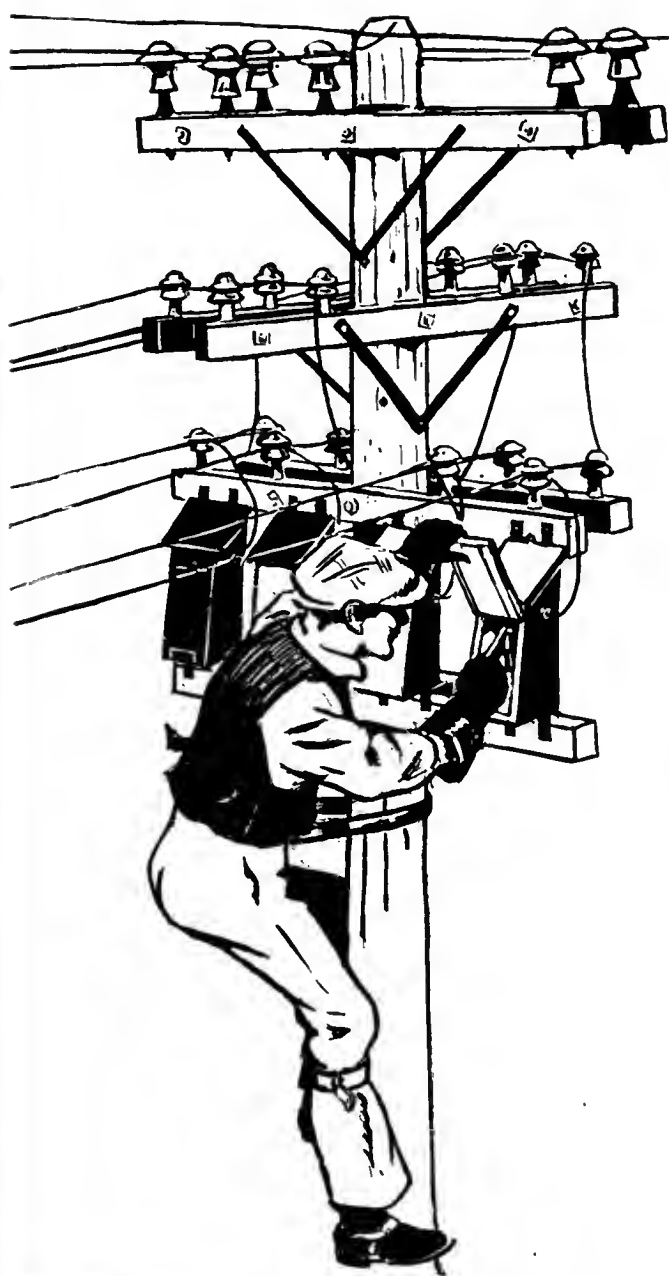
Our booklet tells about "Continuity—and How" to obtain it. Send for a copy.

*The Hardware MAKES the Line—Hubbard makes THE Hardware*

### HUBBARD AND COMPANY

PITTSBURGH

Canadian Manufacturers and Distributors: Acme Stamping & Tool Works, Hamilton, Ontario



## *Lightning Flashes*

*may instantly burn  
out your apparatus  
if not protected  
with—*

## *Garton-Daniels Lightning Arresters*

In nearly every station, on nearly all lines you find the Garton-Daniels—the one type of lightning arrester that has remained unchanged in principle through more than a quarter century of service.

Think of it. For over 25 years they have been protecting many millions of dollars' worth of electrical apparatus. And they have been doing it right, because their small air-gap distance, low series resistance and positive mechanical circuit breaker form a combination which is the most efficient and reliable lightning protective unit known.

And right now, before lightning flashes actually interrupt your service and probably burn out some apparatus, it is indeed the time to consider lightning protection and buy sufficient Garton-Daniels Lightning Arresters to protect all of your important apparatus. Sold by Dealers generally the world over.



Typical Pole Type  
D.C. Arrester

## **ELECTRIC SERVICE SUPPLIES Co.**

*Manufacturer of Railway Material and Electrical Supplies*

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17th and Cambria Streets

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Monadnock Building

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg

# At Home or Abroad

under all conditions of operation, in all climates, with all different kinds of labor, wherever the machine has once been thoroughly tried out, the verdict is always the same in regard to the results attained in the use of the

## Reciprocating Track Grinder "Extremely Satisfactory"

*Companhia Carris de Ferro de Lisboa*  
SOCIEDADE ANÔNIMA DE RESPONSABILIDADE LIMITADA

ENCARREGADA TODA A CORRESPONDENCIA  
A SÉDE EM  
**SANTO AMARO**  
LISBOA

**ENDEREÇO TELEGRAFICO**  
"TRAMWAYS, LISBON"  
**CODIGOS TELEGRAFICOS USADOS**  
A, B, C,  
BROOMHALL,  
LIEBER

Carta n.º	---	MAB
Inclusos	---	ARM

*Lisboa,* 17th November 1917.

Railway Track-Work Company,  
30th & Walnut Sts.,  
Philadelphia  
(America do Norte)

Dear Sirs,

In reply to your letter of the 26th ult.,  
inquiring as to the results obtained from the use  
of the Reciprocating Track Grinder we purchased  
from you sometime ago, we are pleased to say that  
we are extremely well satisfied with it.

Yours faithfully,

*A. O. Koerhorsch*  
General Manager & Chief Engineer.

## Railway Track-work Company

30th and Walnut Streets, Philadelphia

AGENTS: Holden & White, Inc., 343 S. Dearborn St., Chicago  
Wigmore, Hall & Co., Pacific Electric Bldg., Los Angeles, Cal.





### WOMAN COOL IN CAR WRECK.

Conductress Opens Doors Promptly and Gives Aid to the Injured.

The first woman street car conductor in a traffic accident got her passengers out of the car quickly and safely, and did not forget to pull the emergency lever opening all doors, according to the police who investigated a collision with an automobile at Columbus Avenue and 100th Street last night. But the policeman was so embarrassed talking about the accident to the new "lady conductor" that he forgot to take her name.

A car was making great speed down the incline between 100th and 102d Streets when it struck an automobile that was speeding to cross the tracks. The automobile was thrown against a pillar of the elevated structure, and its two occupants, James A. Alilo of 317 East Seventy-fourth Street, and Aubrey McLeod of 177 Wadsworth Avenue, were caught in the wreckage. The woman conductor opened the exits immediately, and allowed the passengers to alight, and then aided the members of a fire truck company to extricate the men. They were attended by ambulance surgeons from the Knickerbocker Hospital.

# The Girls are Making Good

on Cars Equipped with

## National Pneumatic Door and Step Control

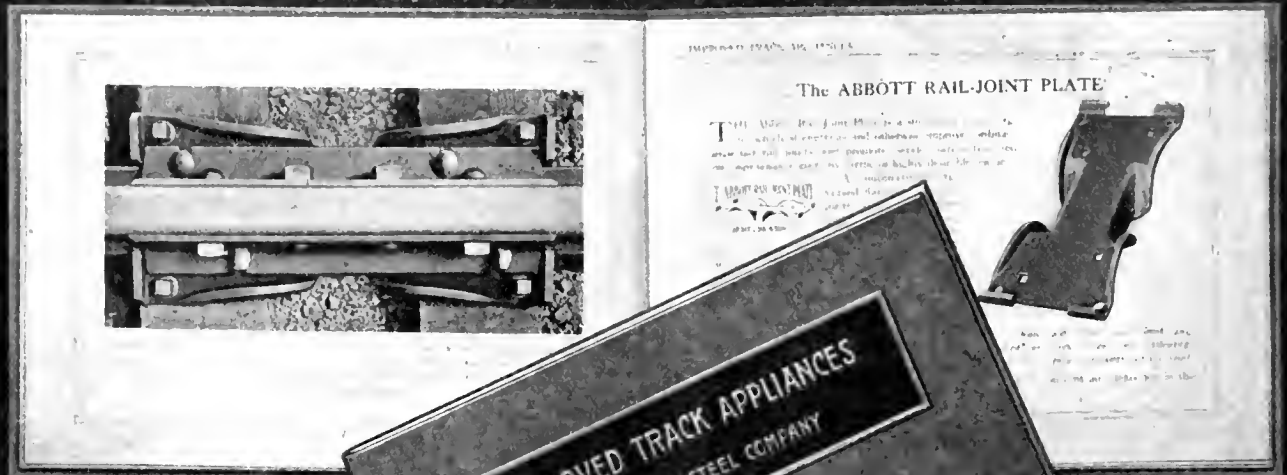
The New York "Times" reports one of the girls as "cool in car wreck." Which one? What difference does it make! They are all cool in emergencies, because National Pneumatic Control does not fail at the critical moment any more than it does on routine work.

# NATIONAL PNEUMATIC COMPANY



50 Church St. New York

515 Laflin St. Chicago



**Send for  
AND READ  
Your Copy**

This book describes and copiously illustrates three appliances that every man responsible for the condition and upkeep of steam or electric railway or industrial track should know more about:

### **The Abbott Rail-Joint Plate**

for the preservation of properly aligned track surface at rail joints, for protection of the rail ends against battering, for greater safety and for reducing maintenance expense.

### **The Lackawanna Safety-Head Angle Bar**

for eliminating the wear and cutting that with ordinary angle bars are a frequent cause of fracture.

### **The Lackawanna Hook-Shoulder Tie Plate**

for holding rails with great security, saving in repair expense and reducing maintenance labor.

The appliances offer possibilities that are too important to neglect. The usefulness of each under various operating conditions is explained in detail in this booklet, of which every page should be carefully read. A copy will be mailed on request.

314

## **Lackawanna Steel Company**

General Sales Office and Works: LACKAWANNA, N. Y.

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BOSTON

BUFFALO  
CHICAGO

CINCINNATI  
CLEVELAND

DETROIT  
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ST LOUIS

SAN FRANCISCO  
HAVANA

## Taking Cars Out of Service

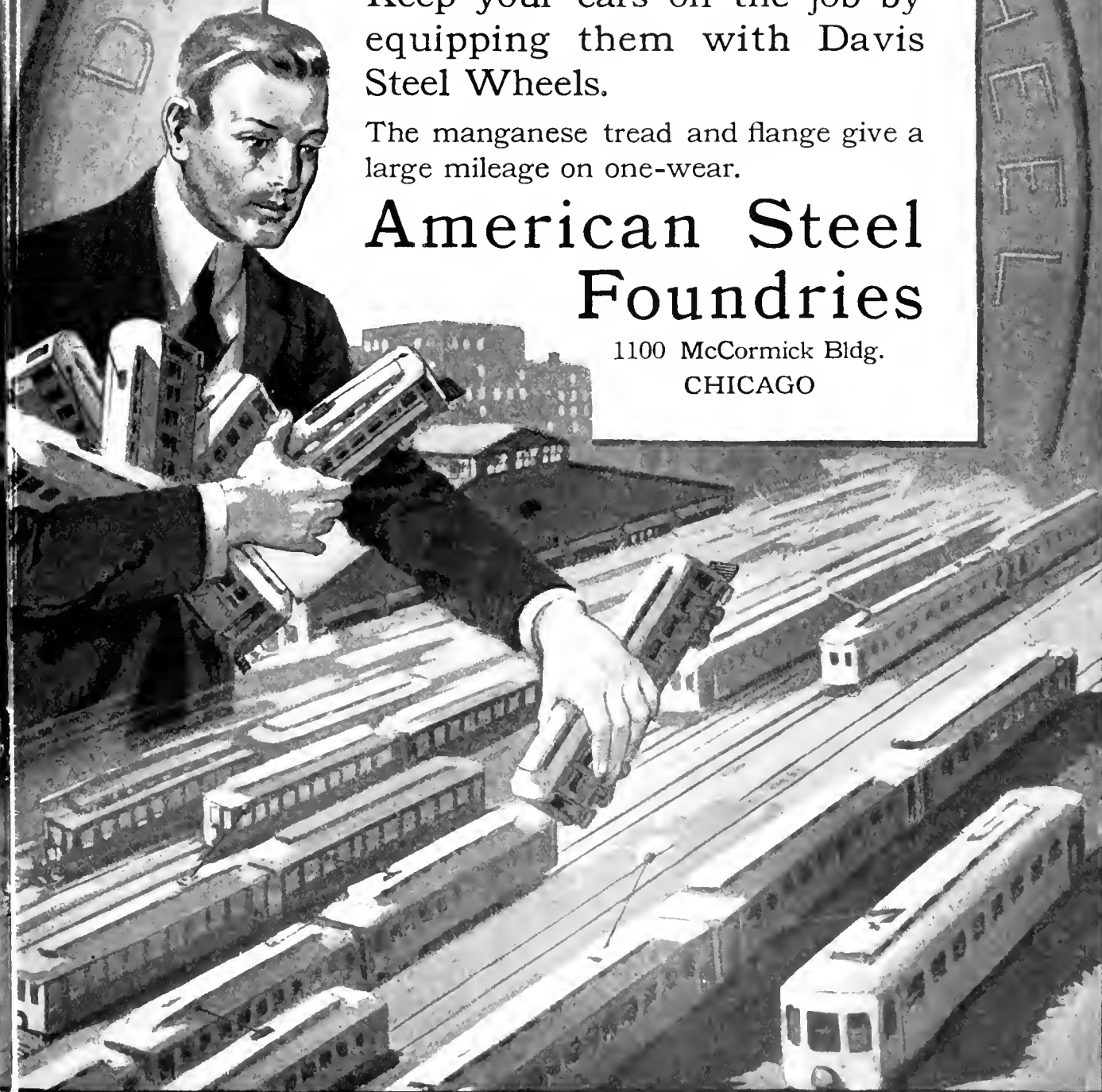
to remove and turn wheels cuts them out as revenue producers.

Keep your cars on the job by equipping them with Davis Steel Wheels.

The manganese tread and flange give a large mileage on one-wear.

## American Steel Foundries

1100 McCormick Bldg.  
CHICAGO





# \$60<sup>00</sup> OR \$1<sup>10</sup>

## Which do you spend when a truck frame like this needs repairing?

That depends on whether you have a LINCOLN ARC WELDER.

When the bolt holes have worn or the frame is cracked you can make it right at a mere fraction of what it would otherwise cost if you have a

# Lincoln Arc Welder

If you haven't got one in your repair department you naturally want to know all about what it will save for you.



Truck Side Frame repaired by the Lincoln Arc Welder. Breaks in the frame or worn bolt holes can be repaired in this way. The holes are filled with new metal and redrilled.

*Write us for your copy  
of Booklet No. 104-J.*

## The Lincoln Electric Co.

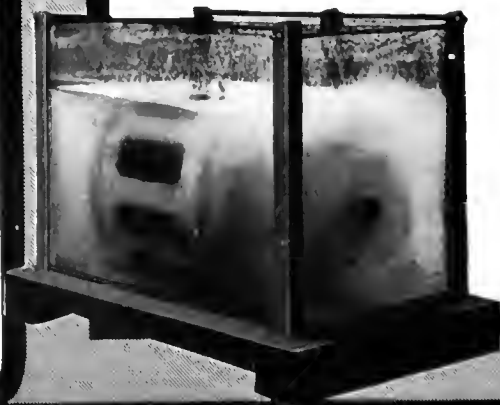
Cleveland, Ohio

New York City  
Buffalo  
Syracuse  
Boston

Chicago  
Columbus  
Detroit  
Pittsburgh

Philadelphia  
Charlotte, N. C.  
Toronto  
Montreal

Agencies in Other Principal Cities





While this old Detroit City Hall was being built in 1832-33 no less than a dozen stage lines were running from Detroit to Ohio cities. The average fare was

## Five Cents for Each Mile

and the stages made money. So much money, in fact, that bus enterprises within the city limits sprang up one after another only to wither and die from lack of patronage. Their fare was 6 cents from the "Depot" to the head of Jefferson Avenue—a distance of a little more than a mile.

When rails were first laid for street car lines,

Detroit had few precedents to go by, and its cars were home-designed and home-built. Lubrication difficulties furnished their share of the trouble and it was not until lubrication began to be treated as a science that progress was faster, rates became lower and runs longer, with ever increasing comforts for the traveling public.

# Galena Oils

and Galena Service are most intimately connected with the growth of the American street railway industry. By means of co-operation with the railway companies and careful investigations of all new developments and changes in equipment it is enabled to render a valuable service to the industry and to become more and more an important factor in the country's transportation development.

**Galena-Signal Oil Co.**  
Franklin, Pa.



# After 4 Years of Use

RAILWAY & ELECTRIC CO.

February 11th, 1918.

Indianapolis Switch & Frog Co.,  
Springfield, Ohio.

Gentlemen:-

In response to your recent inquiry will say that the Welder purchased from you in February, 1914, is still doing excellent work and feel it will continue to for years to come. The many uses we have put the machine to has been the means of our saving many thousand dollars, in material re-claimed and we know we could not get along without it. It is especially valuable at present cost of new material and slow deliveries.

We have had excellent results with the joints we have welded with the machine and consider your Apex Joint and Bonding Plate will give us as near permanent track as is possible to obtain and eliminate the necessary maintenance cost due to repairs to bolts and bonds.

Yours very truly,

(Sgd)

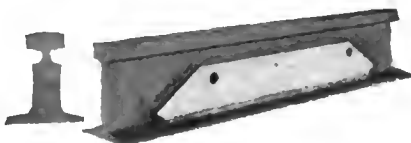
Gen. Supt.

PS: You are at liberty to show this letter to any Street Railway for we are glad to give the benefit of our experience to anyone, and feel that no company should be without a device of this kind.

**27½ cents per day keeps you prepared  
and protected against emergencies—**

In these times the welder will save more than \$100 every day it is used.

"SIMPLEX" Joint for  
High Tee Rail

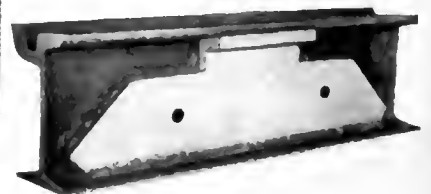


Cost of Operating—

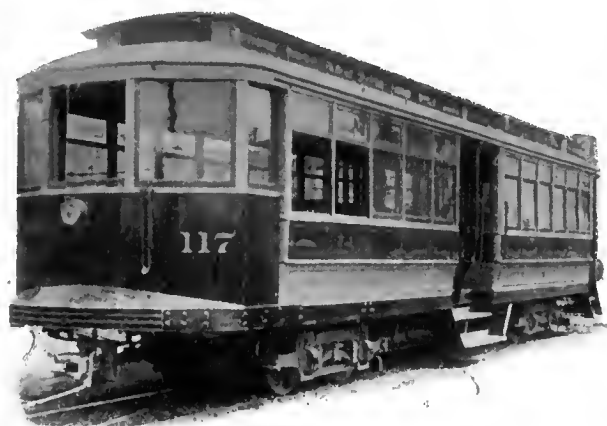
Labor, Current and Steel  
from 1% to 10% of the  
Value of Reclamation.

Average cost of Labor  
and Current to apply  
one pound of steel 20 to  
25 cents.

"APEX" Joint Supporting  
Head for Guard and  
Girder Rail



**Indianapolis Switch & Frog Company, Springfield, Ohio**



# Denver

## Saves \$100 of Coal for every Extra Per Cent of Coast- ing with

# Rico Coasting Recorders

Denver is fully alert to what its duties are in the coal crisis of the nation.

Although it has been using the Rico Coasting Recorder for years, the Denver Tramways came to the conclusion that this was a good time for improvement. So 6.1 Per Cent Increase in Coasting was Obtained in Five Months.

Namely, from June to November, and the corresponding monthly reduction in the coal bill alone was \$600.

## Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO.



61 BROADWAY, NEW YORK

# For Your Inspection

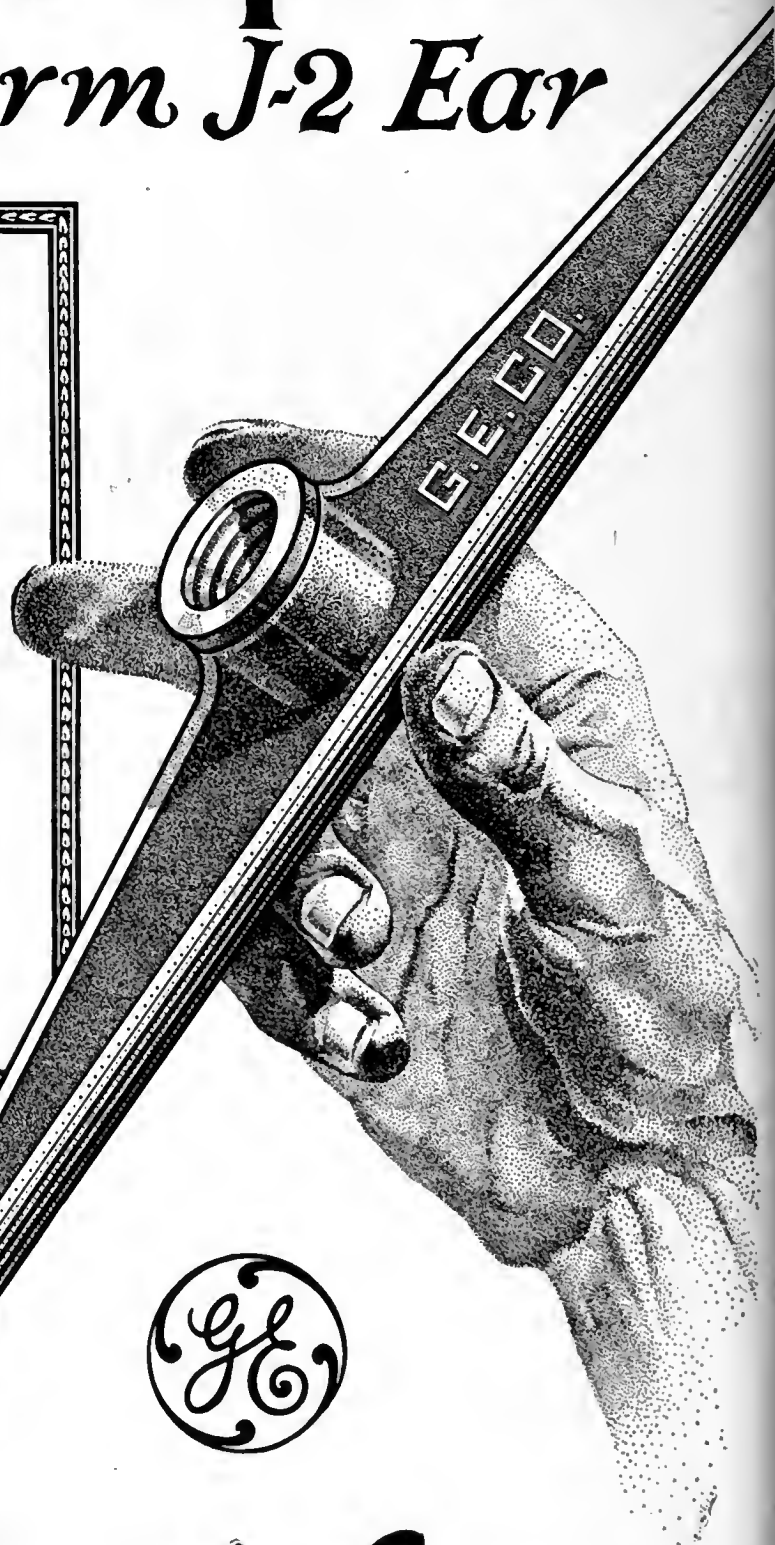
## *The Form J-2 Ear*

The machined fit of the J-2 Ear bears snugly against every side of the trolley wire. This kind of contact gives the greatest amount of holding power possible in a clinch ear.

The lips are also machined to thickness.

G-E Standard Alloy Ears will give you the kind of service that counts.

Stock shipments in any reasonable quantity.



# General Electric Company

General Office: Schenectady, N. Y.

Sales Offices in All Large Cities

# Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 51

New York, Saturday, March 9, 1918

Number 10

## National and Sectional Associations in War Time

SINCE the publication of the editorial two weeks ago on the holding of conventions in war time we have had the opportunity to observe the Central Electric Railway Association in action, with the result that the opinions expressed in the editorial have been substantially confirmed. The success of the annual meeting has led the association to decide that it should hold some kind of a summer meeting, even if this be of the nature only of a get-together affair.

As one reads of the proceedings of the Dayton meeting of this association, which can be done in this and the previous issue of the ELECTRIC RAILWAY JOURNAL, he is impressed by the fact that those in attendance at such a meeting could not but go home with a stronger patriotism and with a desire to place their properties more completely at the disposal of the government for the winning of the war. When electric railways were more prosperous they could get along fairly well without much co-operation, but as their difficulties have multiplied the need for coherency has become more pressing. Now, under the stress of war conditions, united action is necessary if the railways are to withstand the storm and at the same time lend a hand in the solution of war problems.

For this reason we repeat what was said before, namely, that national and sectional organizations should resume in a modified degree the co-operative activities which they maintained before the war.

## Increased Passenger Rates for Steam Railroads Will Help the Electric Railways

A RESOLUTION introduced by Arthur W. Brady at the Dayton meeting of the Central Electric Railway Association contained a plea for higher passenger rates for the steam railroads. While the electric railways have enough troubles of their own without trying to get increased income for the steam roads, this is a case in which both suffer when the steam road rates are too low. It helps an electric railway very little if it secures the right to increase its rate of fare when a competing steam road is held to a rate lower than that which is profitable for the electric railway.

The rate of 2 cents per mile imposed upon steam roads in some places may have been all right when first established, but it is obviously too low now. In the early days the interurban electric railway could compete with its steam rival, even at this rate, but the time when it can do so successfully has gone by. The steam railroad does not depend largely upon passenger business for its profit, so that if money is be-

ing made on the freight traffic it may seem possible for a time to conduct passenger business at a loss. On the electric railways, however, the situation is exactly reversed.

Hence, while the steam roads are concentrating attention to a considerable extent on securing increases in freight rates, it is not illogical for the electric railways to help themselves, and incidentally the steam roads, by urging the reduction of restrictions upon the latter. It is to be hoped, therefore, that the resolution introduced by Mr. Brady will be used as effective ammunition in the campaign for higher inter-urban fares.

## An Inconspicuous Piece of Electrical Apparatus That Demands Respect

THE power plant circuit breaker is a more important element of plant equipment than the space available for the subject in the issue of this paper for Feb. 23 would seem to indicate. In the power plant the circuit breakers are usually inconspicuous, being placed in isolated rooms from considerations of safety, and they are housed in compartments that look more like clothes lockers than anything else. Yet the successful operation of the plant depends largely on these simple switches inclosed in steel cylinders filled with oil and operated by solenoid or motor mechanisms placed overhead.

An engineer stated recently that a single breaker has opened a circuit carrying 500,000 kw.—enough power to operate 25,000 ordinary city cars. Such a statement, however, doesn't mean much even to one accustomed to electrical phraseology, but it is worth visualizing as far as possible. There is no analogy between opening an electric circuit and stopping a heavy train in full motion, as has sometimes been suggested. It is more like the breaking of a belt, or a train of gearing connecting a prime mover and its load. That the amount of energy ordinarily concentrated at the contacts in the circuit breaker is not very great is indicated by the fact that the oil absorbs this energy without excessive rise of temperature. The contacts separate so quickly and the oil flows in between them so promptly that there is little opportunity for heat to develop. Under very heavy short-circuits, however, the oil may be expelled from the cylinders violently and the contacts may be burned. Usually, however, the breaker is ready to be closed as soon as it has functioned, safeguarding the apparatus which it has been set to protect.

When one considers the possible extent to which power can be concentrated in a short circuit in a modern power system he realizes how important is the function of the device which has the duty of relieving the system of load under these circumstances. It is "up to"

the watchdog of the power plant or substation, the circuit breaker, to be on the job. Thanks to the high degree of engineering skill lavished upon its design, it has kept up with the requirements in a wonderful manner.

### Restoring Power Service After an Interruption

THE problem of providing continuous power service has been for some time one of paramount importance. Several articles appearing in recent issues of the ELECTRIC RAILWAY JOURNAL have indicated a number of ways in which interruptions of service are being prevented. Without in any way desiring to detract from the credit due to managers and engineers for the ingenuity and resourcefulness manifested by the application of these expedients, it may be worth while to refer to another phase of the same general subject. A survey of the technical literature dealing with the problem of preventing service interruptions seems to indicate that, in an effort to solve the problem of eliminating all interruptions, too little attention has been given to methods of restoring service once an interruption has occurred. In other words, we have been concentrating on preventive medicine and paying too little attention to remedial medicine. We are told, quite logically, that preventive methods are the best kind to use, but they are not the only ones needed. Think, plan, and insure as we will, we are not yet able to control the elements of nature, and so long as this remains true we shall have service interruptions. However, we can do much in the way of shortening the periods of unavoidable interruptions by foreseeing and planning for possible emergencies. The keeping and analyzing of records of service interruptions constitute an extremely good start in forming a basis for such planning.

### The Montreal Tramways Seem Assured of an Adequate Power Supply

VERY few electric railway systems are situated as fortunately as is that at Montreal, Quebec, with respect to power supply. Its neighborhood abounds in water powers, many of which are highly developed. There is possibly 500,000 hp. of supply available now, which is a large quantity compared with the ultimate requirements of the Tramways. The general aspects of the Tramways' power situation were explained recently in an article in this paper, and this week we give some of the details of substation and conduit lines. These articles show that the company is endeavoring effectively to use all possible sources of power, so to insure continuity of service and reasonable cost. When the general rehabilitation of the power system is completed, and it is now approaching completion, the company will have an unusually homogeneous transforming and distribution equipment.

Some engineers will be inclined to criticise the Tramways company for the use of motor-generator sets. In the articles we have endeavored to set forth as clearly as possible the reasons for the use of this type of equipment rather than rotary converters. We assume that if the whole distribution plant were to be renewed, rotary converters might be used. The old motor-generator sets were so satisfactory, however, that it was perfectly natural that they should be continued in use

until it has been clearly demonstrated that they must be "scrapped" in the interests of economy. We like to consider a power system, like anything else, as having a kind of personality, its present character reflecting its environment and other causes contributing to its development. For this reason, and in order that JOURNAL readers may examine the present power situation at Montreal intelligently, we have gone more than usually into the story of its growth.

### Commissions Should Face Squarely the Question of a Fair Return

TOO frequently in recent fare cases the commission has seemed desirous not of granting the increase needed to bring the rate of return up to a fair average but merely of giving the petitioning company a little more revenue than it had been getting. In other words a pittance of relief rather than exact justice has been awarded.

Commissions have usually held that low rates of return in some years are balanced by high rates of return in other years and that the utilities are entitled to only a fair average rate of return. They have tended to disregard the fact, however, that there must be a slight margin in the prosperous years if these are to counterbalance bad years. Hence their policy, interesting in theory, has not amounted to much in practice.

The situation has become worse than ever during these war days. Capital is harder to get now than in normal times, and it is a very important question as to what increase should be made in the old restricted rate of return in order properly to reward capital for engaging in the electric railway business. Some commissioners feel that while the rates should not be made so low as practically to be confiscatory, yet the maximum rate of return should not be expected. Bankers and utility operators feel, however, that under present conditions a return of from 10 to 12 per cent is needed to accomplish the results which were formerly secured by a 6 per cent return.

Investors want to know what rate of return can be expected in abnormal times. When regulation began they assumed that the rates of return mentioned by commissions would be assured in bad as well as in good years, or that a fair average would be maintained. But the commissions have not squarely faced the question of a fair average. Forgetful of increasing costs of operation, they have hoped too much that net income would be restored at some time in the future without their aid. As a result the average rate of return on more than one property has seriously declined, rendering the company's investment values unstable.

The investors have learned a lesson. Until the commissions announce frankly and explicitly a liberal rule for calculating the future rate of return, capital is likely to glance askance at electric railway investments. Will the commissions henceforth protect a fair average rate of return by allowing the companies to charge fares high enough to accumulate some reserve for surplus and contingencies? This question is not simply of academic interest. The investor must be made to feel secure. Speculative profit has been removed from utility securities, and commissions should hesitate no longer to assure safety of principal and income in its place.



## Why Not Use Automobiles Less and Trolley Cars More?

A COPY of the 1917 Proceedings of the Southwestern Electrical & Gas Association just received, shows that one of the speakers brought up the increasing tendency of heads of railway departments, in their trips around the systems, to travel in company automobiles rather than on the cars. The claim was not made that automobile transportation should be entirely given up. The time saved by this means of transit is important, and on many kinds of trips its use may be warranted. Nevertheless, we think that the critic of this practice at the Southwestern meeting was right when he said that when a manager or the head of a department uses an automobile habitually for getting around his work instead of the cars, he misses seeing a great many things about car operation which he would see if on the car. In fact, one case was reported of a city in which, during an investigation being made of traffic conditions, it developed that the officials of the company knew very little about the traffic conditions of their cars because they never rode on them.

The question of example set to others is one which might also be considered in this connection, especially in the smaller cities where the officers of the company who have to travel about are well known by sight to most of the citizens. In such cases it would be rather difficult for a manager to find fault with others for riding in jitneys or their own automobiles, when he depended habitually upon an automobile himself for getting about.

## All Unnecessary Construction Should Cease to Conserve Funds and Labor

GOVERNMENT plans to restrict heavy financing for private enterprises or for purely local improvements having nothing to do with war activities may have the effect of checking the extension of railway lines in cities where such work has been done every year by ordinance requirement. Aside from the patriotic motive which would direct the use of a large proportion of available capital for war purposes, there will be the additional advantage of conserving the already restricted supply of labor for other work. Suggestions from various state councils of defense that public improvement work on streets, bridges, etc., be postponed wherever possible during the coming year have aroused opposition in certain political circles, owing to the prospective loss of this class of "patronage jobs." However, such considerations are not likely to prevail if the higher needs of the nation call for a diversion of labor to other fields.

Meanwhile it should not be out of order to suggest a slacking up in "forced" extensions so as to give electric railways a chance to "recover their breath"—financially—while studying ways to make ends meet. Necessary track repairs for the purpose of keeping roadways up to a proper standard of maintenance should go on as usual, but the prevailing policy in some cities of compelling the local companies to build so many miles of track each year regardless of actual needs would appear out of place, when there are better uses for such funds. Study of cost and earnings will show

in many cases that compulsory extensions are not remunerative to the investors and of no actual need to the occasional patrons of the new lines. Doubtless they help certain real estate promoters to dispose of property, but the drain on other remunerative lines is likely to be such that the people as a whole suffer where they might have been aided had such expenditures been made for well-considered traffic betterments.

## Some Things the War Is Doing To and For Electric Railways

AS THE FIRST anniversary of the entry of the United States into the world war approaches, it is worth while to attempt to size up the situation so as to utilize the experience so far gained in preparing for the tug-of-war which undoubtedly is to come. The collapse of Russia probably means a considerable prolongation of the war, and if it is to last for several years more, each successive year is going to present greater operating difficulties for the electric railways. There will be a real test of the mettle of the industry here, as there already has been one abroad. In the railway business, as in the country's military, naval and aerial preparations, we must get ready for a long continuation of hostilities.

It would seem as if any business could not be harder hit than was ours during the past year. The war has brought sky-rocket prices of materials, shortage of labor, money and materials, unusual transportation burdens, etc., and it will bring more of these. It's a mighty uncomfortable time for the responsible manager or the responsive employee, but it's a time when there is much of promise visible to those who look on the business as a means of service rather than merely a means of livelihood. The times are separating the sheep from the goats.

The great lesson that the war is teaching is that operating conditions and public standards of service have undergone tremendously rapid changes in but a few years, making it very difficult to meet the requirements with existing equipment. Unfortunately, there is scarcity of money with which to buy new equipment, but such money as is available is being spent more intelligently than ever before. To this end electric railway operation is being analyzed as never before also, and promising economies are constantly being discovered.

Moreover, the public, through its representatives, is permitting the introduction of economies that would have been turned down in peace times. If a public body or official can be shown that a proposed practice will directly or indirectly contribute to the conservation of our war resources, the chances are that this practice will be approved and even encouraged. It is reasonable to assume that privileges granted under stress of war will not be withdrawn afterward if they are proved not to conflict with public interest.

We realize that it is an immense subject that has been touched upon in this and preceding editorials on the war situation. The conditions pictured in outline are very difficult, but they need not be discouraging. The present, however, is no time for either timidity or discouragement on the one hand, or, on the other, for complacency or indifference to the seriousness of the situation which confronts us.

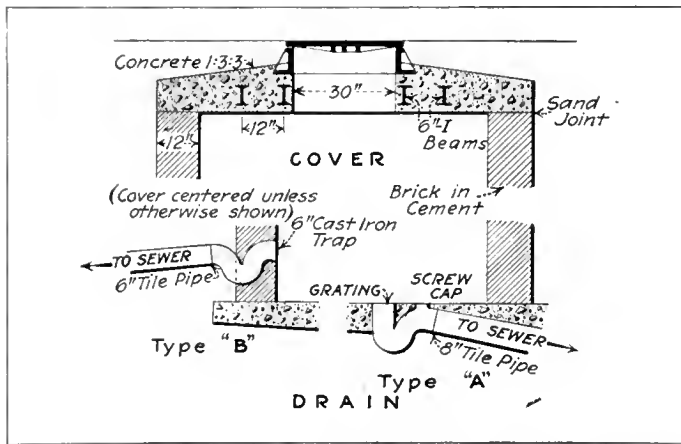


FIG. 1—CROSS SECTION OF STANDARD MANHOLE SHOWING TWO TYPES OF DRAINAGE

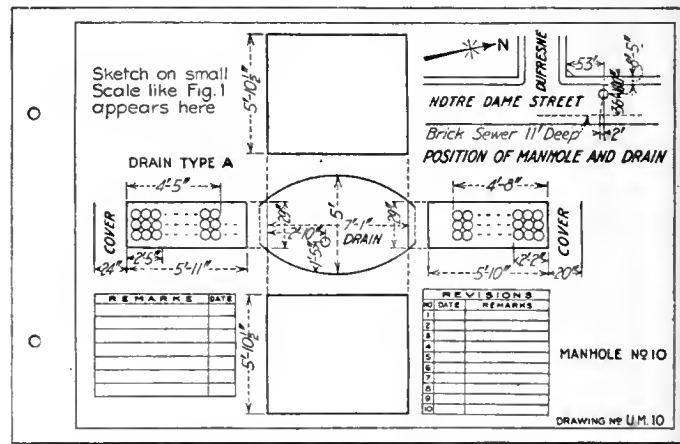


FIG. 2—SAMPLE 6 1/2 X 8 1/2 IN. LEAF FROM FIELD NOTEBOOK, SHOWING MANHOLE LAYOUT AND DRAINAGE SCHEME

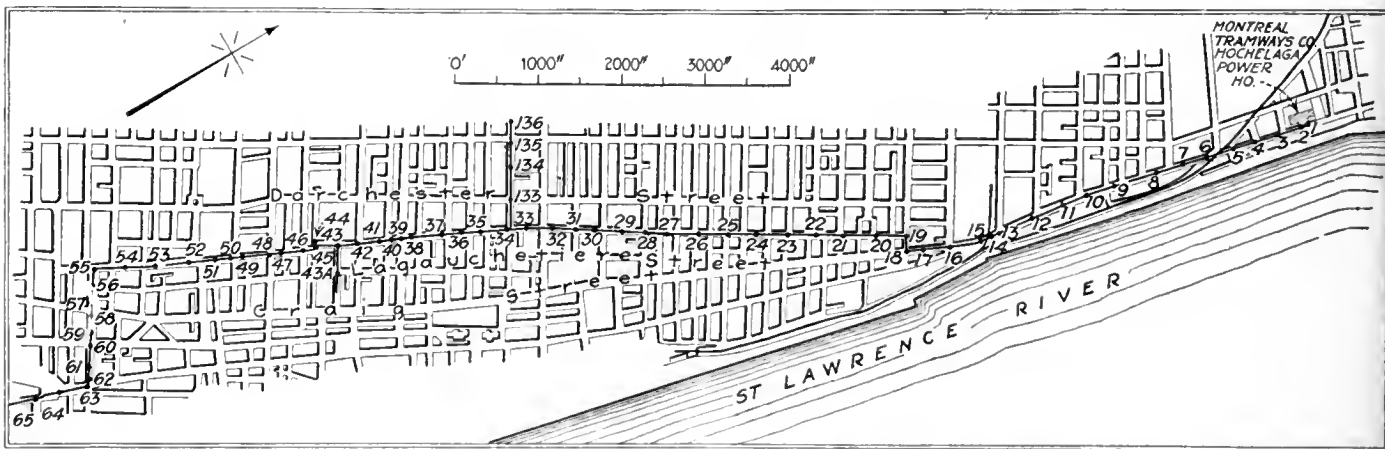


FIG. 3—SAMPLE PLAN USED BY MONTREAL TRAMWAYS FOR IDENTIFYING MANHOLE LOCATIONS. ACTUAL SCALE USED 500 FT. TO THE INCH

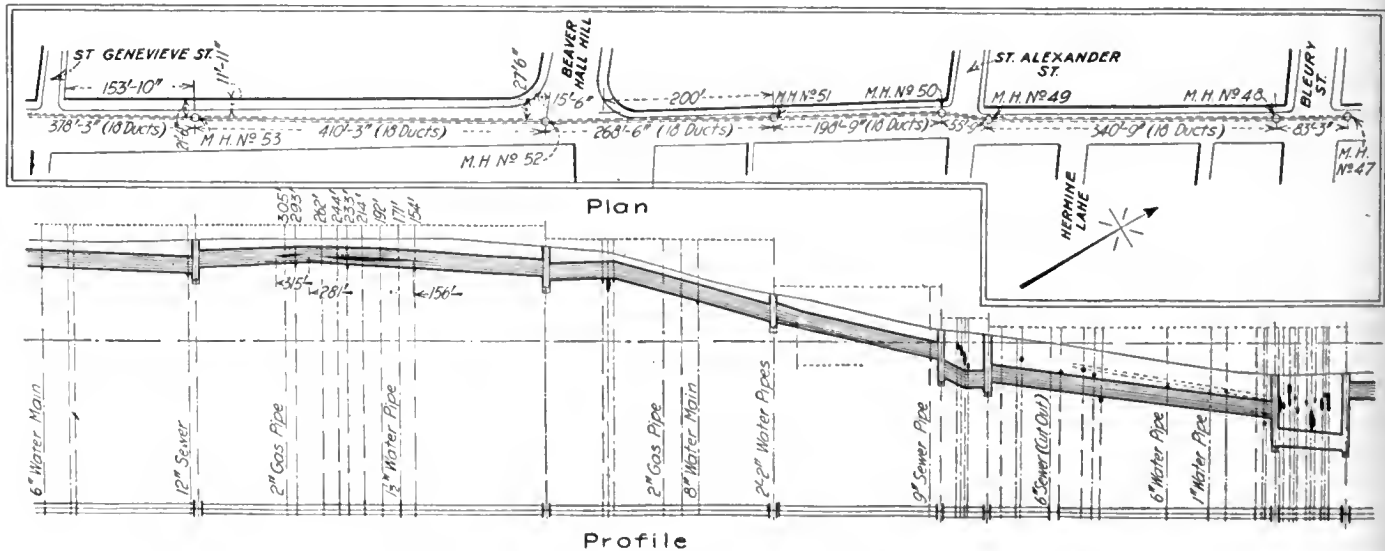
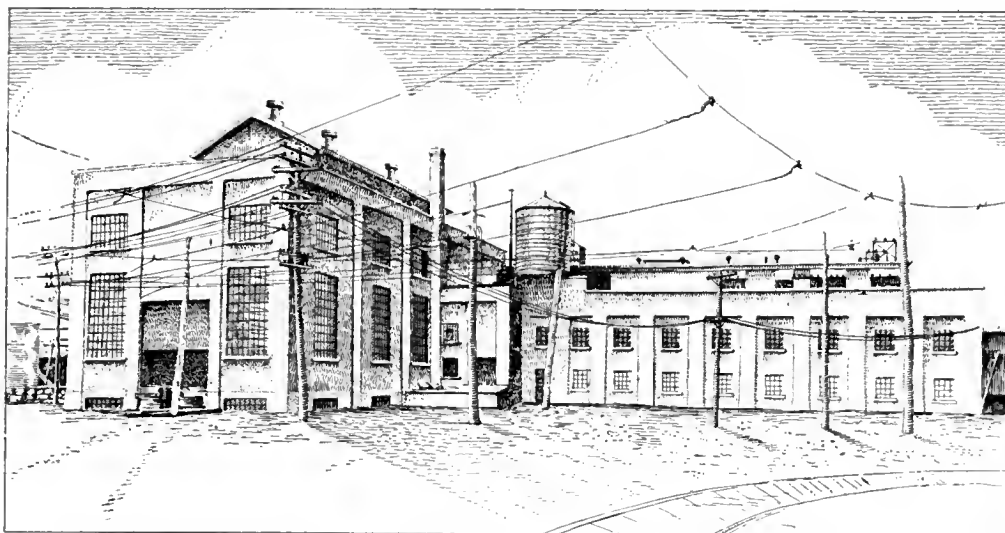


FIG. 4—SAMPLE DUCT LAYOUT AS USED BY MONTREAL TRAMWAYS. ACTUAL SCALE, VERTICAL, ONE-EIGHTH INCH TO THE FOOT; HORIZONTAL, ONE INCH TO FIFTY FEET

Typical Diagrams of Conduit Work of the Montreal (Quebec) Tramways. The Drawings Selected Show Not Only the Technical Features of the Design but Also, and Particularly, the Method Used for Recording the Details of Manholes, Conduits, Obstructions, etc.



VIEW IN THE ANGLE OF THE ST. DENIS SUBSTATION, MONTREAL TRAMWAYS

# Power Distribution for the Montreal Tramways

**Standardization Combined with Flexibility and the Effective Utilization of Existing Equipment Were Primary Design Considerations in the Rehabilitation of the Power System of This Company**

**I**N PLANNING the comprehensive remodeling of its power generation and distributing system, as outlined in the issue of the *ELECTRIC RAILWAY JOURNAL* for Jan. 12, 1918, the Montreal Tramways had in view the ultimate standardization of equipment, duct lines, etc., so that the power facilities could be kept more intimately related to the extension of the tramway service than it had in the past. As Montreal is located in a district rich in water power, steam will be used only as reserve power, and the substations will be more and more the important elements in the power layout.

At present there are two steam stations in operation and nine substations, including the two steam plants which also act in this capacity. These are indicated on the map in the Jan. 12 issue. In the city proper the substations will be connected by means of a high-tension underground system, and in addition the Tramways Company will utilize, for low-tension distribution, the municipal ducts which the city has installed in the downtown business and residence districts for the use of the power and tramway companies but not for high-tension lines.

The company has standardized on the use of motor-generator sets, the tendency being toward a unit of 1500-kw. capacity. In general these will be synchronous motor sets, which experience has shown to be easy to operate, both with respect to starting and stopping, and to load distribution.

Connecting its power plant with most of the substations,

the company uses duct lines of No. 0000 three-conductor, round-conductor cable, paper insulated. The insulation around individual conductors is  $\frac{1}{4}$  in. thick and there is a  $\frac{1}{4}$ -in. jacket around the three. The working voltage is 13,200, so that this insulation gives a very large factor of safety. One of these cables is considered to be good for the maximum output of two substation units, that is, 4000 kva. The cables were fabricated by the Northern Electric Company, and potheads of the Standard Underground Cable Company's manufacture were used.

Where cables pass under railroad tracks or are located on hills they are sheathed with lead containing

1 per cent of tin for the purpose of toughening the sheath and increasing its tensile strength. Elsewhere the lead is pure. On the hills anchoring devices are used to prevent creeping. The ducts in the high-tension system are of 4 in. nominal diameter, the conduit being laid up of single duct. While this diameter is larger than is necessary for the cables at present in use, it was selected to provide for a possibility of using larger cables later, to render installation and removal of cables easy and to furnish liberal air space for ventilation. The

duct diameter is larger than is used in the municipal conduits, where the standard is  $3\frac{1}{2}$  in. nominal. Ventilation is also assisted by the use of perforated covers for the manholes.

In the manholes the cables are wrapped with compo-



THIS IS AN ENTRANCE INTO A SUBSTATION, NOT A CARNEGIE LIBRARY

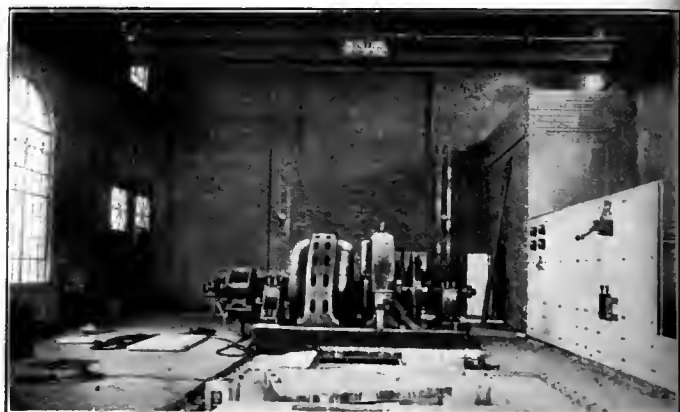
sition metal lath laid over oiled paper to protect the lead from the action of the cement with which the lath is plastered. At every manhole the cables are bonded together and grounded to a ground cone located in the bottom of the manhole. The cone is made of No. 25 gage sheet copper, 24 in. long, 6 in. in diameter at

engineers' notebooks. These sheets also contain information regarding drainage and grounding, which has been removed in the illustration to simplify the reproduction.

The whole conduit system is also charted on a large scale in plan and profile, as shown in Fig. 4, with par-



LATEST SUBSTATION OF MONTREAL TRAMWAYS, AT POINTE AUX TREMBLES, SHOWING ARCHITECTURAL TREATMENT



FIRST MOTOR-GENERATOR SET INSTALLED IN POINTE AUX TREMBLES SUBSTATION, MONTREAL TRAMWAYS

the open bottom and tapering to about one-half this diameter at the top. It is filled and surrounded with coke and is connected by No. 0000 copper cable 4 ft. long to the cable bond.

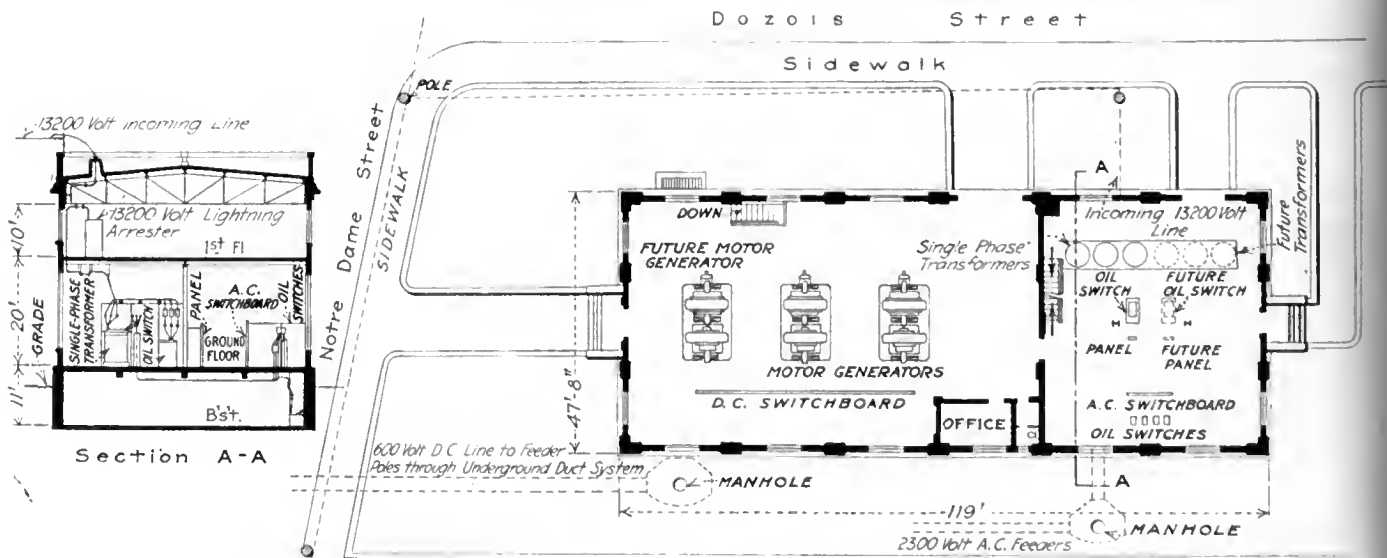
In the  $9\frac{1}{2}$  miles of conduit there are 184 manholes located so that the maximum length of cable does not exceed 350 ft. These manholes are of standard form, oval in plan. They are 8 ft. long, 6 ft. wide and 6 ft. deep, and have cast-iron covers 30 in. in diameter. The general dimensions and method of drainage are indicated in Fig. 1.

Fig. 2 is reproduced from a standard manhole record sheet to show the method used for keeping track of the cables in each manhole and the method of draining it. On the same sheet is a plan locating the manhole with

#### SUBSTATIONS OF MONTREAL TRAMWAYS COMPANY

Name of Substation	No. and Size of Motor-Generating Units	No. and Size of Transformers
Pointe aux Trembles	One 1000 kw. synchronous. One 500 kw. induction	Three 800 kw.
St. Henry	Two 500 kw. induction	Three 500 kw.
St. Denis	One 1500 kw. synchronous. Three 500 kw. induction	Three 500 kw.
Youville	Two 1500 kw. synchronous	Two 3000 kva.
Shawinigan	One 500 induction	Three 200 kva.
Cote des Neiges	Three 1000 kw. (rotary)	
Cote St. Paul	One 1000 kw. synchronous	
Cote St. (proposed)	One 1200 kw. synchronous	Not decided.
Hochelaga (in power plant)	One 2000 kw. (rotary)	One 3000 kva.
William St. (in power plant)	Six 500 induction motors. One 500 synchronous motor. Three 1500 synchronous motors	One 3000 kva.

\*Transformers are property of Shawinigan Water & Power Company.



FIGS. 5 AND 6—SECTION THROUGH TRANSFORMER AND SWITCH ROOM OF POINTE AUX TREMBLES SUBSTATION, MONTREAL TRAMWAYS, AND GENERAL PLAN OF SUBSTATION

respect to the nearest street intersection permitting a prompt identification of the manhole when ground is covered with snow by reference to the general conduit plans, one of which is reproduced in Fig. 3. Data sheets like that shown in Fig. 2 are reduced to pocket size,  $6\frac{1}{2}$  in. x  $8\frac{1}{2}$  in., for insertion in the field

ticular reference to other underground pipes and conduits.

The details of power transforming units in the substations are given in the table above.

As there is much similarity in detail in all the substations and as the Pointe aux Trembles and St. Denis







# C. E. R. A. Urges Immediate Need for Higher Interurban Fares

At Dayton Meeting of Feb. 28 and March 1 Speakers Showed Keen Appreciation of the Acuteness of the Present Situation Confronting Urban and Interurban Electric Railway Lines—Summer Meeting Favored

ON Feb. 28 and March 1 the Central Electric Railway Association held at Dayton, Ohio, what was considered by those in attendance to be a most successful practical war-time meeting. With the exception of President C. N. Wilcoxon's address, received too late for the purpose, the Feb. 28 session was reported in last week's issue of the JOURNAL. The presidential address is given in extended abstract this week. At the March 1 session A. Swartz, Toledo, Ohio, read a paper prepared by A. C. Van Driesen, Toledo Railway & Light Company, on the work of the Central Electric Railway Accountants' Association. This was abstracted in last week's issue.

The remainder of the meeting was taken up with a number of business matters, interspersed with music by a male quartet organized by J. F. Starkey, Lake Shore Electric Railway, Sandusky, Ohio. Besides Mr. Starkey this quartet was composed of three brothers, Earl Bragdon, E. W. Clark & Company, Columbus, Ohio; Irving Bragdon, Toledo & Ohio Central Railroad, Columbus, and Roy F. Bragdon, Lake Shore Electric Railway, Sandusky. They were accompanied by Charles Buck, a business man of Sandusky.

C. L. Henry reported regarding correspondence between the officers of the association and the Electric Railway War Board as to sectional representation at Washington. The association had offered to co-operate with the War Board in a practical way and had suggested the appointment of a sectional representative. Mr. Henry expressed the opinion that the whole matter for the future should be left entirely with the executive committee of the association, and this suggestion was adopted by the meeting.

A. L. Neereamer then read his report as secretary-treasurer, an abstract of which appeared last week. He stated that the data presented showed the association to be in a very flourishing condition, and that the executive committee will invest \$500 of the money surplus in a bond in the Third Liberty Loan campaign.

## HIGHER FARES FOR STEAM AND ELECTRIC ROADS

A. W. Brady, Anderson, Ind., outlined the situation regarding higher fares for interurban electric railways, with particular reference to the difficulty of raising rates when competing steam lines are limited to rates lower than those which are profitable to electric railways. He believed that the present is an opportune time for bringing the situation forcibly to the attention of governing bodies, and proposed the following resolutions, which were adopted:

*Whereas:* Since the entry of the United States into the war, the operating expenses of the interurban lines within the territory of the Central Electric Railway Association, comprising Ohio and Indiana and parts of Michigan, Kentucky and Pennsylvania, have increased at such an alarm-

ing rate as to threaten the continued financial stability of the interurban companies and seriously to impair the ability of those companies to furnish to the public adequate and proper service, and

*Whereas,* it is imperative to the warding off of impending disaster that the interurban properties promptly secure substantial additions to their revenues, and

*Whereas,* the chief obstacle to a readjustment of the rates of the interurban companies, so as to meet the rapidly increasing costs of operation and maintenance, is found in the 2-cent fare laws of the various states, which laws, either directly by their inclusion of interurban lines within their scope or indirectly by their control of the passenger rates of the competing steam railroads, render it impossible for the interurban companies to secure sufficient increases in their revenues by advancing their passenger rates, and

*Whereas,* there is a material discrepancy between the intrastate rates of the steam railroads, amounting to 2 cents per mile under the 2-cent fare laws, and the interstate rates of 2½ cents per mile of the same carriers, which interstate rates were approved by the Interstate Commerce Commission as fair and reasonable at a time when operating costs were materially less than now, and

*Whereas,* whatever the fact may have been when the 2-cent fare laws were originally enacted, a fare of 2 cents per mile is manifestly insufficient to meet the cost of the service under present conditions, therefore be it

*Resolved,* That the attention of the various federal and state authorities having to do with the regulation of railroad rates be called to the facts stated and to the critical character of the situation thereby created, and that those authorities be urgently requested to take, as rapidly as possible, whatever steps may be necessary to fix new rates for the railroads, both steam and electric, on a basis fairly compensatory to them and at the same time reasonable and just to the public. Be it further

*Resolved,* That the president of this association be empowered and instructed to arrange for a proper presentation of the action hereby taken to the federal authorities at Washington and to the authorities of the various states.

## JOINT STATE COMMITTEES OF PUBLIC UTILITIES

Mr. Brady also digested the reports of the work of a joint public utilities committee,\* consisting of P. H. Gadsden, H. H. Crowell and E. K. Hall. This committee has been influential in collecting public utility data and presenting them convincingly and fruitfully to the federal administration. The joint committee has recommended the appointment of state committees to maintain touch with public utility commissions and other state officials to keep these authorities fully informed on utility matters.

Mr. Brady moved that, in conformity with this recommendation, the president of the association appoint an electric railway representative in each of the states in C. E. R. A. territory, this representative to serve with similar representatives of the electric, gas and other utility interests. The motion was unanimously passed and announcement of the names of the appointees will follow in a few weeks.

In bringing up the question of the next meeting Mr. Henry moved that a summer meeting or outing be defi-

\*See ELECTRIC RAILWAY JOURNAL, March 2, 1918, page 427.

nitely arranged for by the executive committee, and this motion was passed. In its support he said that, while it had seemed necessary to abandon the lake trip last summer, and while it is still necessary to retrench expenditures during these busy and sorrowful days, yet such retrenchment must not be carried too far. It is not possible to work continuously for several months without some such recreation as the association activities afford.

A resolution was also passed, to be wired to E. B. Peck, who was kept from the meeting by illness, expressing sympathy and appreciation of the preparation by his committee of a most successful program for the Dayton meeting.

#### ELECTION OF OFFICERS

The last business of the meeting was the election of the men recommended by the nominating committee, as follows: President, F. W. Coen, vice-president Lake Shore Electric Railway, Sandusky, Ohio; first vice-president, J. F. Collins, vice-president Michigan Railway, Jackson, Mich.; second vice-president, R. I. Todd, president Indianapolis Traction & Terminal Company,

Indianapolis, Ind.; secretary-treasurer, A. L. Nee-reamer, Traction & Terminal Building, Indianapolis, Ind.; executive committee—F. D. Carpenter, president Western Ohio Railway; H. A. Nicholl, general manager Union Traction Company of Indiana; L. G. Parker, general sales manager Cleveland Frog & Crossing Company; W. D. Hamer, representative Electric Service Supplies Company; C. N. Wilcox, president Chicago, Lake Shore & South Bend Railway; S. W. Greenland, general manager Fort Wayne & Northern Indiana Traction Company; F. J. Haas, general manager Public Utilities Company; R. A. Crume, general manager Dayton & Troy Electric Railway; F. R. Coates, president Toledo Railways & Light Company; E. J. Burdick, assistant general manager Detroit United Railway; E. B. Peck, vice-president Terre Haute, Indianapolis & Eastern Traction Company, and A. C. Van Driesen, president Central Electric Railway Accountants' Association.

After the election of officers President-elect Coen took the chair, announced an immediate meeting of the new executive committee and adjourned the convention.

## Radical Readjustment Necessary\*

At Dayton Meeting President of C. E. R. A. Analyzes  
the Electric Railway Situation and Indicates  
How It Will Likely Be Improved

BY C. N. WILCOXON

President Chicago, Lake Shore & South Bend Railway, Michigan City, Ind.

**B**URDENS have been piled upon the electric railway industry until the situation now confronting it will require the most careful thought and the greatest effort of all concerned, if the properties are saved from financial ruin. This is a somewhat radical statement, but it is fully justified by the facts.

The conditions under which the majority of our properties have been operated, for the last twelve or fifteen years, have gradually resulted in a reduction of the margin between income and outgo, until, in many instances, there has been nothing left for the owners. In fact, in some instances the income has been insufficient even to pay taxes and operating expenses. Expansions or extensions have long since been a thing of the past.

#### WAR HAS ADDED TO BURDENS

The worldwide war has caused our burdens to multiply many fold during the last two or three years. Yet our industry has a very important part to play in helping to win the war. I am not referring to the minor task being performed to a limited extent in the movement of men and supplies for the army, or to the possibilities of greater usefulness disclosed by the study of railway conditions. I am rather pointing to the task of properly serving those industries upon which the army, the navy, and, indeed, the whole people are dependent.

The people, if they are properly to solve the problems which must be solved in order that our country shall emerge greater, stronger, abler and better from the

crisis, must face the facts in regard to our industry, as they must face facts relating to other important matters. They must recognize the call of necessity. They can no longer temporize with a situation that has become so acute, or indulge in speculation when prompt action is such a prime requisite for the good of all.

There is but one remedy for the situation, and that is to receive more for the service rendered. In a number of instances the rate of fare has been slightly increased; in many other cases relief has been refused. The few increases that have been allowed are not in any manner in keeping with necessities. The majority of the municipalities, in a short-sighted view of the matter, practically refuse any assistance. Many officials oppose us, not because they believe us not to be entitled to consideration and relief, but because they believe such opposition to be politically expedient. In other words, our industry has been the football of politics for years past. We are saddled with all kinds of assessments for public improvements, many of which are no benefit to our companies.

#### REMEDY MUST BE FOUND

That we must find a remedy for this condition cannot be questioned. This is our big job of the immediate future. An enlightened public opinion, brought about at least in part by honestly and frankly informing the public of the true condition of the average electric railway, must in time manifest itself through the action of the public service commissions, the municipalities and the legislative bodies. If this does not bring us fair treatment and increased revenues, so that we can render good, safe and reliable service to the public, pay fair

\*Abstract of address delivered before annual meeting of Central Electric Railway Association, Dayton, Ohio, on Feb. 28.

wages to our labor and earn a reasonable profit for the owners of our properties, then there is no hope for us.

Organization, team work and publicity, seemingly, are the greatest factors at our disposal in bringing about the needed relief. That a radical readjustment of our industry must be made to save it from bankruptcy requires no argument. The accumulating burdens of legislation and regulation, which in many instances amount to strangulation, added to the enormous increase in operating expenses, have brought our industry to a point where relief must be given. If we are to continue to pay the cost of paving streets, keeping them clean and maintaining them in repair for the benefit of the general public, the public must pay by an increase in the price for their rides.

#### PASSENGER RATE ON MILEAGE BASIS

The best way to accomplish this result must, to a certain extent, be determined by local conditions. As regards the electric interurban railways of the Middle West in which the Central Electric Railway Association is most directly interested, these have apparently developed passenger business to its greatest extent. Any increased revenue from that source in the future must largely be confined to the natural growth of the communities through which the interurban railways operate. This fact seemingly makes an increase in the passenger rates an absolute necessity.

I do not believe it can be questioned that the 5-cent zone system, heretofore largely used as a basis of determining the fares of interurban railways, is in the majority of instances unfair both to the company and to the traveling public. The basic rate should be a certain price for each mile, the so-called "copper zone" system being used with a basic rate sufficient to leave a reasonable profit to the company for each passenger carried.

I am of the opinion that our association could well afford to assume the cost of placing before the public the true condition of the electric railways in its territory, and I recommend that it give the matter careful consideration.

#### FREIGHT BUSINESS SHOULD BE DEVELOPED

One source of revenue is entitled to most careful consideration—and that is the freight business. Unfortunately many of the older interurban railways are handicapped by certain physical conditions which restrict their usefulness and ability as freight carriers. This situation is not, however, insurmountable. In view of the congestion and the inability of the steam railroads to care properly for the public needs at this time, there is a great opportunity for many interurban companies to extend their facilities for the handling of freight, particularly in carload lots. The cost of correcting the physical conditions, which in many cases interfere with the handling of standard equipment, is not prohibitive. The question of equipping lines to handle standard equipment—thus freeing them from the restrictions of the so-called "package freight" business which exist in the case of the large majority of our companies at this time—should receive the most careful thought.

I believe I am safe in predicting that it will only be a question of time until the steam railroads, which in

the past have placed so many obstacles in our way, will be compelled to interchange business with us on a basis fair and just to both parties, to the very great benefit of the general public.

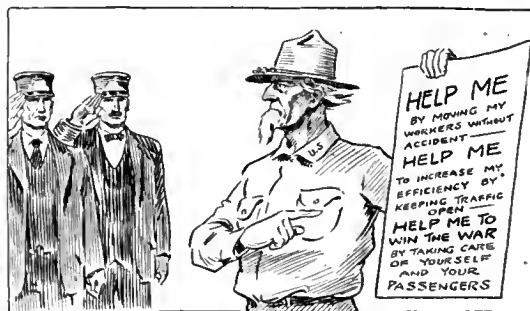
Splendid work has been accomplished by our committee on military efficiency and defense in gathering data relating to our properties and publishing a map showing their location and possible use in national service. I fear, however, that the possibilities have not been made fully known to the government officials. If I am correct, I would most earnestly recommend that the matter receive attention without delay, to the end that everything possible may be accomplished not only for the benefit of our properties but for the greater benefit and duty we owe our country at this time.

#### Patriotic Poster of N. S. C.

The accompanying poster, showing the relation between accident reduction and patriotism, has been issued under the auspices of the electric railway sec-

## UNCLE SAM WANTS YOU

### TO ENLIST IN HIS ARMY OF CONSERVATIONISTS



#### ENTRUSTED TO YOUR CARE

is this valuable equipment and the lives of thousands of passengers. As you leave on your run, make this resolution for their safety

#### NO ACCIDENTS TODAY!

The saving resulting from every accident prevented is needed to bring victory to the cause of liberty, justice and peace.

A TIMELY AND TELLING N. S. C. POSTER

tion of the National Safety Council. It emphasizes the fact that conservation of life and limb is an important factor in winning the war. The Council has also issued a striking wall calendar for 1918.

#### Employees of Eastern Railroads

The general operating committee of the Eastern railroads states that there are about 564,300 men in the service of the Eastern railroads, of whom about 301,500 have had one year or more experience. To fill the remaining places 1,138,500 new men have been employed during the first nine months of 1917, or more than three men for every job. This has necessitated the employment, training, and subsequent loss of a man on each job every ten weeks. This is about twice the normal turnover.







# Raising the Fare from Seven to Ten Cents at the Public's Request!

How the Fair-Minded Communities Served by the Worcester & Warren Street Railway Came to Approve a Higher Rate of Fare, One-Man Cars and Freight-Express Operation—An Example of Better Public Relations Realized

THE Worcester & Warren Street Railway is one of those half-town, half-country railways built in the halcyon days when the magic of the word "electricity" was expected to cancel such trifling drawbacks as lack of population and passengers to pay for rails, wire, power, cars and crews! For nearly a score of years it struggled manfully against growing odds before the inevitable receivership; but with the jitney and war prices added the problem was reduced to this phase of finality: "To junk or not to junk?"

The temptation to give up the fight when metal could be sold at fabulous prices was strong, but the owners courageously determined to learn if engineering advice and public relief combined would enable the railway to continue the service on which five communities had depended for more than twenty years. To this end E. W. Holst of Boston was engaged as consulting engineer. As will appear in the sequel, his activities were not confined to saying that one man cars, express-freight service and 10-cent fares were necessary, but were expanded to include a successful campaign for the approval of these suggestions by the communities themselves before going to the Public Service Commission of the State!

## ROAD HAS HAD CHECKERED HISTORY

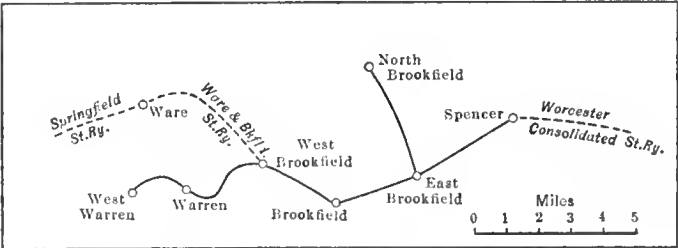
The total length of the road is 19.6 miles. The main line extends from the terminus of the Worcester Consolidated Street Railway in Spencer, through East Brookfield, Brookfield, West Brookfield and Warren to West Warren, a distance of 16.06 miles. A branch line extends from a point just west of East Brookfield to North Brookfield, a distance of 3.54 miles. The lines were built by the Warren, Brookfield & Spencer Street Railway in 1896. This company, after an unsuccessful financial career, went into receivership in 1912 after defaulting its bond interest. Its liabilities were about \$321,000.

(Concluded from page 456)

The effect of this policy was noticeable in many ways. The Chamber of Commerce, the city government and various suburban communities, appointed committees to be present at the fare hearing. The position taken, however, was not one of opposition, but merely of investigation. The strongest objections to the new zone rates arose in certain sections which were hit hardest, because for years they had had the best of it in long rides. There was not much objection to the 6-cent fare itself, though many objected to the reduction of the old 5-cent city zone. More than one hearing will probably be needed, but it is expected that a decision will then be given without undue delay, perhaps in three weeks.

In April, 1915, it was sold at auction to a bondholders' committee and shortly afterward was purchased by the present company, organized for the purpose. The "fair cost of replacing the railway and property so acquired" was found by the engineering department of the Massachusetts Public Service Commission to be about \$160,000, and the property was taken over at this figure. As a result of the reorganization all the capital stock and the floating indebtedness of the original company, amounting to about \$200,000, were wiped out. The total authorized capitalization is at present \$186,000, or \$9,623 per mile of road, an exceedingly low figure.

In the entire history of the property dividends have been paid in only four years—4 per cent having been paid in 1896, 2.5 per cent in both 1899 and 1900, and 2 per cent in 1901. Earnings have been decreasing for some time. Yearly receipts reached their maximum in 1903, when they totaled \$65,415. Since then, and notwithstanding the fact that the fare was increased in



Lines of Worcester & Warren (Mass.) Street Railway, showing connections with adjoining electric railways

January, 1905, from 5 cents to 6 cents, receipts have been declining. The total in 1916, \$45,952, was the lowest since 1897, with the exception of the year ended June 30, 1917, when the total revenue was \$45,502. This falling off in revenue appears in large part due to the 25 per cent decrease in population in the towns served:

	1895	1915
Spencer	7,614	5,994
Brookfield	3,279	2,059
W. Brookfield	1,467	1,288
Warren	4,430	4,268
N. Brookfield	4,635	2,947
Total	21,425	16,556

The normal schedule is maintained by four cars operated on an hourly headway, the running time from Spencer to West Warren being one hour and thirty minutes. Fares were increased from 6 to 7 cents on April 5, 1917, with the approval of the Public Service Commission. This made the total through fare 35 cents, and overlaps applied only to town boundaries.

No transfers are used. Workingmen's tickets are sold at the rate of 6 cents, these being valid between 6 and 8 a. m. and 5 and 7 p. m., according to the Massachusetts law.

The operating results for the year ended June 30, 1917, covering nine months with the 6-cent fare unit and three with the 7-cent unit, were as follows:

Income from passenger cash fares.....	\$42,110
Income from ticket sales.....	3,123
<b>Total income (including miscellaneous).....</b>	<b>\$45,502</b>
Transportation and traffic.....	\$15,306
Power.....	16,566
Maintenance.....	12,400
Taxes.....	1,282
Salaries, office and general expenses.....	3,221
<b>Total expense (including all items).....</b>	<b>\$50,433</b>
Interest.....	3,153
<b>Total.....</b>	<b>\$53,587</b>
<b>Deficit.....</b>	<b>\$8,084</b>

Since its incorporation the company has operated the property at an actual loss, the accumulated deficit from May, 1915, amounting to \$6,846 on Nov. 1, 1917. During this period the income has not been sufficient to enable the company to pay any compensation to its officers or any dividend. The inability to meet operating expenses has been due to the increased cost of labor, fuel and supplies and to the decrease in population. Maintenance cannot be properly cared for with the present revenue, and traffic has undoubtedly been lost through the inability of the company to keep up proper service.

#### HOW THE NEW MANAGEMENT ANALYZED CONDITIONS

When the increased fare was established, the directors realized the necessity of improving the service in order to derive any material benefit from the new rates and secured the services of the consulting engineer mentioned. After going over the property, he prepared a report pointing out that with the institution of various economies, rehabilitation and the use of one-man cars, combined with the establishment of a light freight and express service and the purchase of power, prospects would be favorable for curing the chief evils from which the road was suffering.

Immediate attention, he said, should be given to the track on account of the long-deferred maintenance. The line and bonding should receive attention with the track; the rolling stock should be cared for, and power should be purchased in place of the expensive service of the company's generating plant. The present power plant is operated under the handicap of unsuitable machinery of an out-of-date type, high coal cost and an exceedingly poor load factor. It was believed that purchased power from a company able to supply hydroelectric energy as the service required would certainly save \$3000 a year. In July, 1917, an arrangement for purchasing power was effected with the Central Massachusetts Power Company, but as yet the railway has been unable to take advantage of it owing to lack of funds for conversion apparatus. Operating changes were also recommended, such as through connection over the Ware & Brookfield Street Railway (now also in difficulties) to Ware, thereby encouraging through riding between Spencer and Palmer.

This analysis, reduced to figures, showed the following:

#### ANALYSIS OF BETTERMENT COSTS

<b>Expenditures:</b>	
Five light-weight prepayment one-man safety cars.....	\$26,000
Power substation equipment for purchased energy.....	8,000
One snowplow.....	3,000
Two express cars.....	6,000
Miscellaneous equipment and tools.....	500
Track, line and bonding improvements.....	30,000
Heating and building repairs.....	3,500
<b>Total.....</b>	<b>\$77,000</b>
Credit: Old power station equipment and rolling stock..	8,000
<b>Net betterment costs.....</b>	<b>\$69,000</b>

#### OPERATING SAVINGS

<b>Savings per annum:</b>	
Platform labor by use of one-man cars.....	\$4,800
Power.....	3,000
Maintenance.....	3,000
<b>Total.....</b>	<b>\$10,800</b>

#### ESTIMATED INCOME STATEMENT

Operating income (1917 fiscal year).....	\$45,500
Estimated increased income on account of improved service and increased fares (10 per cent).....	4,550
Estimated income from freight and express service (20 per cent).....	9,100
<b>Total income.....</b>	<b>\$59,150</b>
Operating expenses (revised to cover 1917 fiscal year)....	\$53,580
Less savings.....	10,800
<b>Expenses.....</b>	<b>\$42,780</b>
Balance.....	\$16,370
Possible increase in operating expenses.....	5,500
<b>Balance.....</b>	<b>\$10,870</b>

#### IMPROVEMENTS ALREADY BEGUN

During the last summer track improvements costing \$8,758 were carried out in addition to the regular maintenance outlay. All this work was in the nature of permanent improvements and therefore was charged to capital accounts. In the rehabilitation of track mainly the old rail was used, the rail being bonded with an oxy-acetylene equipment. This equipment was used in cutting off rails too much worn at the ends, new holes being drilled and new tie plates being attached. It is expected that the life of the old rails will be considerably increased by the use of one-man cars.

#### RECEIPTS ABOUT SAME UNDER 7-CENT FARE

The increase in fare to 7 cents has been offset by decreased riding, so that the net receipts are about the same as before. This is shown by the following table:

	1917	April	May	June	July	August	September
Cash passengers.....	1917 42,017	51,661	53,923	69,897	70,537	60,389	70,161
Ticket passengers.....	1916 47,014	63,979	59,198	74,462	76,998	70,161	70,161
Total passengers.....	1917 2,068	7,058	5,712	1,657	1,567	3,377	3,377
Revenue.....	1916 4,859	8,522	7,748	3,826	3,856	7,527	7,527
	1917 44,085	58,719	59,635	71,554	72,104	64,277	64,277
	1916 51,873	72,501	66,946	78,288	80,854	77,693	77,693
	1917 \$3,149	\$3,762	\$4,089	\$4,964	\$5,015	\$4,449	\$4,449
	1916 \$3,083	\$4,104	\$3,864	\$4,662	\$4,804	\$4,611	\$4,611

In the foregoing table the revenue from cash passengers was based upon a 7-cent fare unit, taking effect April 5, 1917. In any of the months following the fare increase the revenue from 7-cent fares can easily be obtained, therefore, by multiplying the total cash passengers by 7 cents. The total passengers carried in the fiscal year 1917 was 370,368, as compared with 428,152 in 1916, a decrease of 57,784.

The traffic distribution is shown by the following typical passenger counts, taken during three months in 1917 from 4 P. M. to 5 P. M.:

	April	May	June
Spencer—East Brookfield.....	1,009	1,051	1,251
East Brookfield—Brookfield.....	600	815	771
Brookfield—West Brookfield.....	431	562	611
West Brookfield—Warren.....	282	457	391
Warren—West Warren.....	298	360	321
East Brookfield—North Brookfield.....	454	614	691

These figures indicate that the traffic density increases as one travels eastward, attaining a maximum in the Spencer-East Brookfield and North Brookfield district. It is hoped to increase the density of traffic on the central and western sections by improving the connections with the Ware & Brookfield line and hence to the Springfield Street Railway at Palmer. A connection with the tracks of the Worcester Consolidated Street Railway in the town of Spencer was also considered desirable. This has since been obtained, as hereinafter noted.

#### LABOR COST WILL BE HIGHER

From Oct. 25 to Nov. 3 the union men on the road went on strike, following demands for an increase of  $1\frac{1}{2}$  cents per hour. The schedule of wages for motor-men and conductors prior to the strike was as follows: First year, 22.5 cents; second year, 23 $\frac{1}{2}$  cents; third year and thereafter, 25 cents. The management took the position that it could not grant the men an increase until the revenue was greater, and after a conference it was agreed that the company would pay the men 2 cents more per hour thirty days after the beginning of electric express service. It is estimated that the promised wage increase will add approximately \$2,000 per year to operating expenses.

#### GOING STRAIGHT TO THE PUBLIC WITH A STRAIGHT STORY

In the foregoing paragraphs the history of the Worcester & Warren Street Railway has been presented in detail. But this is not the main point of the story, for electric railway men are only too familiar with this sort of thing. What is important and encouraging is the way the public has shown its confidence in the good faith of electric railway operators.

No sooner had the report on "Analysis of Betterment Costs," "Operating Savings" and "Estimated Income Statement" been presented by the consulting engineer than copies thereof were given to an official representative of each town, so that the people would have the opportunity to study all of the facts for themselves. The report was then followed up by personal discussion of the need for the express-freight franchise and connection, one-man car operation and a 10-cent fare. As the last, it was pointed out that since a 7-cent fare had failed to produce more revenue, it was useless to ask for a 10-cent fare unless the public thought the electric railway service was necessary enough for the majority of people to have them pay that figure willingly.

This straightforward line of argument met with immediate favor.

On Nov. 14, 1917, a conference of leading citizens was held before the commission, at its suggestion, to discuss the financial condition of the road. At the close of the conference the attendants arranged to call a public meeting at Brookfield of all the towns. At the latter part of the five communities elected two men to serve on a committee of ten. By Nov. 22 this committee had drawn up, and on Nov. 24 submitted to the officials of the railway at a formal hearing at Brookfield, the document reproduced herewith, probably the first of its kind in America or anywhere else.

Of the nine out of ten members (one Brookfield representative being absent) who signed this memorable statement, Mr. Kane is an attorney and counsel for the

town of Spencer; Mr. Young, president of the Spencer National Bank and a representative in the State Legislature; Mr. Fullam, president of the National Bank of North Brookfield; Mr. Beebe, treasurer of the North Brookfield Shoe Company; Mr. Butterworth, attorney and counselor for the town of Brookfield; Mr. Richard-

### An Unique Document in Better Public Relations

BROOKFIELD, MASS., Nov. 22, 1917.  
TO THE DIRECTORS OF THE WORCESTER & WARREN STREET RAILWAY.

Gentlemen:

*At a meeting of a committee representing the towns of Spencer, The Brookfields and Warren, held on Thursday, Nov. 22, 1917, at the Selectmen's Room, Brookfield, Mass., the following recommendations were made.*

*That we suggest to your board that it would be advisable to advance the regular passenger fare to 10 cents, the workmen's ticket remaining at the present price.*

*That the car service be curtailed by stopping the regular cars at 10 p. m. to lessen running expenses, and that, when necessary, special cars could be run to accommodate the demands of special occasions;*

*That the Selectmen of the towns mentioned above be urged to grant the freight franchise to your company at once;*

*That we are ready to go before the Public Service Commission, if necessary, to assist you in carrying out these plans.*

Signed:

Spencer—JERE R. KANE

M. A. YOUNG

West Brookfield—C. D. RICHARDSON

ALBERT L. HAUCK

North Brookfield—WILLIAM F. FULLAM

CHARLES A. BEEBE

Warren—EDWARD D. SULLIVAN

W. D. HOSLEY

Brookfield—A. F. BUTTERWORTH

son, chairman of the Board of Selectmen of West Brookfield; Mr. Hauck, retired civil engineer and gentleman farmer; Mr. Sullivan, chairman of Board of Selectmen, Warren, and Mr. Hosley, secretary Warren Board of Trade. The positions which these men hold in their communities is pretty clear proof that the railway's troubles had been put before men who needed the electric railway much less than the working people, whose favored rate they did not suggest raising.

#### THE FARE INCREASE EFFECTED

Acting upon the good feeling and recommendations expressed by the citizens' committee, the railway on Dec. 3, 1917, filed a new tariff increasing the 7-cent fare to 10 cents. Ordinarily thirty days' notice is required before a fare increase can go into effect, but upon the representations of the company the commission allowed the new fare to go into effect after ten days, or on Dec. 13.

Thus through the cordial co-operation of the communities, no protracted arguments and hearings were necessary.

On Jan. 24, 1918, in accord with a petition filed on

Oct. 30, 1917, the town of Spencer granted the Worcester & Warren Street Railway the right to make track connection at Spencer for the handling of freight. In the meantime the right to carry newspapers, packages, express matter and freight had been granted by Spencer on Dec. 13, 1917; the Brookfields and Warren, on Dec. 10, 1917, and by the Public Service Commission itself after due hearing on Feb. 6, 1918. At the State hearing no one appeared against the track connection permit. On the contrary, Mr. Richardson, chairman of the committee of ten, appeared for it!

The same frankness and direct dealing that characterized the arguments for the need of more revenue and express-freight were applied to the question of the one-man car. Instead of leaving the public in the dark, a safety car was leased for demonstrations to the committee of ten. They were so well pleased that when formal application was made before the Public Service Commission for the general use of one-man cars there was no opposition whatever.

#### THE PRESENT SITUATION

At this time the company needs about \$70,000 for new equipment and about \$30,000 to pay off a floating debt of \$30,000. It is hoped that with further co-operation by the communities and with such legislative relief as is now pending, this property will not only be able to survive but to give ever-improving service to the towns which have shown such an intelligent and liberal understanding of its difficulties.

Since Jan. 17, 1918, service has been temporarily suspended owing to inability to secure fuel.

#### COMMON SENSE NEWSPAPER COMMENT

Speaking of the situation the Worcester *Telegram* of Nov. 1 said in part, editorially:

"In a small town of New York State the people were shocked when the trolley outfittings were sold to a junk dealer who took up the tracks and closed the service. Over there they were sorry, though they had refused to submit to having the fare raised above the 5 cents they had paid for many years. The people even thought too late that it would have been better to pay 10 cents a ride than to lose the service. It was a distinct loss to them because it meant commercially being pushed back into the woods. \* \* \* If the one-man cars cannot save the Worcester & Warren system, even with an increased list of fares, the junk buyer will arrive at his own sooner or later. But the people should have reasonable means to get to the city markets. They are not inclined to go back to the days of half a century ago, and the automobile is not yet so economical that every village or farm family can own one for hurrying back and forth to the city."

The effect of coal shortage and the readjustment of business on account of the war are beginning to show in the returns made by electric utilities. Reports of the central stations for December, 1917, indicate an increase of 11.5 per cent in revenue from the sale of energy and of 9.6 per cent in the kilowatt-hour output as compared with December, 1916. Estimated from returns for 55 per cent of the industry, the business for the whole industry in December was: Revenue, \$44,450,000; output sold, 2,345,000,000 kw.-hr.

## Saves 2000 Tons of Coal a Month

This Economy Secured in Cincinnati by Skip Stops—Other Savings Put Into Force by Street Railroad Commissioner Culkins

AN ACCOUNT of the savings made by economy measures introduced this winter on the Cincinnati electric railway system is given in a report recently submitted to the Cincinnati advisory committee of the United States Fuel Administration by W. C. Culkins, director of the department of street railroads of the city of Cincinnati. The department had prepared a plan for undertaking these reforms more gradually early this year, but when the request came from the federal administration for early action it was decided to put the changes into effect promptly. In many respects the conditions were not propitious for the change. During last winter the city experienced the heaviest fall of snow, the lowest temperature and the longest duration of cold weather in its history. In addition there were two floods. For this reason the report of results made by Director Culkins is of especial interest.

#### REPORT ON SAVINGS IN CINCINNATI

Pursuant to the order issued by you on Jan. 14, 1918, directing the Cincinnati Traction Company to take measures for the conservation of coal, this department undertook the general supervision of the execution of that order. I have the honor to report herewith, relative to the progress made in the carrying out of such order up to this date.

The Chapel and Seventh Streets lines and all of that portion of the Third-Fifth Street line lying east of Fifth and Baymiller were abandoned on Jan. 19, 1918. In the year 1917 these lines operated approximately 500,000 car-miles. Taking the statistics of the Cincinnati Traction Company for the month of November, 1917, it is found that it requires 15.9 lb. of coal for each car-mile of operation. On this basis the saving of coal by the discontinuance of these lines will amount to about 4000 tons of coal per year.

Referring to that portion of your order directing the elimination of double stops, you are advised that this department has already eliminated the double stops in Cincinnati by order issued on January 1, 1918.

Your order directing the installation of the skip-stop system has been carried out under the most unusual adverse conditions. In no city, where this plan has been adopted, has it been attempted during the winter or upon all lines at the same time.

In Cincinnati the installation was made during the most severe weather in the history of the city when the streets and sidewalks were covered with ice and snow. Notwithstanding this fact, evidence that the public generally are in sympathy with the plan is found, in that complaints and suggestions were received on less than 3 per cent of the stops changed.

At the time of the issuance of your order, there were on the lines of the Cincinnati Traction Company, 5331 stops. There are now 3301, 2030 having been eliminated or approximately 38.3 per cent. This does not include the double stops eliminated, which would bring the average up to 41.8 per cent. The average former distance between stops was 440 ft., and the average distance under the new plan is 694 ft., making the average added distance between stops 254 ft. Since it requires one minute to walk 266 ft., it will be seen that no great hardship has been entailed. Under the old plan the average number of stops was 12.1 per mile. This has been reduced to 7.8 stops per mile.

The actual saving of coal, by the elimination of these stops, can be determined only by experience, since each city presents its own peculiar conditions. However, a fair estimate may be had by taking as a basis the report on fuel saving by the introduction of the skip-stop system in Washington, D. C. This report was made by a board consisting of Clarence Renshaw and Myles B. Lambert of the Westinghouse Electric & Manufacturing Company, and John F. Layng of the General Electric Company. Their report was approved by L. B. Stillwell, consulting engineer, chairman; W. F. Durand, professor of mechanical engineering, Leland Stanford University, and Comfort A. Adams, professor of electrical engineering, Harvard University.

# Why a Crisis Exists

## F. J. Macleod Points Out Inherent Defects in Electric Railway Situation and Present System of Regulation

FOR present conditions in the electric railway industry, which are rapidly becoming intolerable for both the investors and the public, the war, in large measure but not wholly, is responsible. Indeed, the war has served only to disclose and intensify certain troubles and defects which are inherent and of long standing. Such is the opinion of F. J. Macleod, chairman Massachusetts Public Service Commission, as expressed in a recent address before the Economic Club of Boston.

### INHERENT RAILWAY TROUBLES

One inherent trouble, Mr. Macleod said, is over-production. Massachusetts has more electric railway mileage in proportion to its population and area than any other state in the Union. This mileage is in many cases badly located. Such a condition is the result of the era of speculation which set in with the advent of electrification. Competitive lines were built where there were traffic possibilities for a single line only, and lines were extended anywhere and everywhere in the sparsely-settled rural districts where there was no reasonable financial excuse for building at all. Most of these lines were saved from bankruptcy or the scrap heap by consolidation on a share for share basis with the more prosperous lines. From this union of prosperous and potentially bankrupt companies there emerged a number of electric railway systems with just sufficient vitality to keep their heads above water during fair weather, but incapable of meeting the stress of hard times or war conditions.

Broadly speaking, Mr. Macleod stated that Massachusetts electric railways immediately before the opening of the war were paying dividends as large as the average paid during the last twenty years, and were neither better nor worse off than at any previous time during this period. During this time the companies were content to provide for the bare needs of current

repair and maintenance. The large units of property were, however, gradually becoming worn out or obsolete, and the time was constantly growing nearer when replacements could no longer be deferred. As practically nothing was being done to make provision in advance for meeting this situation, the real financial condition of the companies was not disclosed by the dividends paid, or by the apparent results of operation, and the war merely precipitated a crisis which was imminent in any event, though probably in a less acute form.

Up to the present time the average dividends paid have been less than the going interest rate, and the rates of fare in some cases have probably been too low to support the properties. The companies, however, prior to the establishment of the Public Service Commission, made little serious effort to increase their rates or to face the problem in any thorough-going fashion. It was not until 1913 that rate-making powers were assumed by the commonwealth. Since that date, in Mr. Macleod's opinion, the commission has found it necessary to go farther than any other board in the country in allowing increases of electric railway fares, and in part as the result of war conditions to go farther even than the companies are willing to go on their own responsibility during the entire period when the rate-making power was practically in their own hands.

The commission has also endeavored, to the best of its ability and within the limitation of its powers, to stimulate greater operating efficiency on the part of the companies, and has succeeded in bringing about changes in methods which have resulted in substantial increases in net revenue. It was impossible, however, by any scheme of public regulation to put back at once the values which had been gradually drained out of the properties during a long series of years, and even the gradual rehabilitation of properties and credit which was about to set in was offset by war conditions.

### DEFECTS IN REGULATORY SYSTEM

The present regulatory system, Mr. Macleod averred, has failed, at least in the electric railway field, to meet the fiery test of war. Possibly the personnel of the public service commission is in part responsible, and abler and wiser men might have secured more satisfactory results. With similar conditions prevailing throughout the entire country, however, and in the light of the practical break-down of the regulatory system in the steam railroad field under war conditions, it is felt that the causes must lie deeper than mere defects of personnel in a single commission.

In the first place, there has been a lack of proper co-operation and co-ordination of activities between the companies and the regulating authorities. The present system in effect makes the companies and the commission jointly responsible for results and by its very nature requires them to work in double harness and pull together. In practice, however, the commission has been obliged in the main to leave practical operation

*(Concluded from page 460)*

According to their report, if, on the traction lines in Washington, D. C., the number of stops were reduced 40 per cent, the effect would be the saving of one-eighth of the coal used. The Cincinnati Traction Company consumes approximately 150,000 tons of coal annually, and upon the basis of their report, the saving would be approximately 9,000 tons per year. However, Washington is a flat city, requiring less power to start cars, and in addition its power houses are operated with an economy varying from 1.9 lb. per kilowatt-hour to 4.1 lb. per kilowatt-hour as compared with 4.72 lb. per kilowatt-hour in Cincinnati, therefore the saving in Cincinnati might be even greater than in Washington, and the total from the elimination of stops and the discontinuation of the three lines may result in the total saving upward of 25,000 tons per annum. The full benefits of his plan of operation both for conservation of coal and for the convenience of the public have not been realized because of weather conditions preventing the revision of schedules. I have this day issued an order requiring the Cincinnati Traction Company to proceed with schedules and will suspend any further changes until this has been accomplished. The company has conformed with your other orders, with the exception of that relative to the shortening of certain lines, which is now under consideration.



entirely in the hands of the management and periodically to hold a post-mortem on past financial and operating methods in capitalization and rate cases.

To Mr. Macleod's mind, one needed reform is for the commission to keep in constant and intimate touch with practical electric railway operation, and to give the companies the benefit of the advice and suggestion of its experts in regard to the most efficient and advanced methods of operation. In the past, Mr. Macleod said, such a program would not have received a very cordial welcome from the operating officers of the companies, but a different spirit now exists. In his opinion significant evidence of that fact is an editorial in the *ELECTRIC RAILWAY JOURNAL* of Feb. 9, advocating the admission of public service commissioners to full membership in the American Electric Railway Association.

Mr. Macleod thinks that the present system would be greatly improved if the commission were empowered to employ an adequate technical staff whose main function would be to prevent possible mismanagement or inefficiency of operation, rather than to sit in judgment upon past errors and to attempt to correct them after the damage has been done. In other words, public regulation must in large measure be preventive rather than punitive if the best results are to be obtained.

In the second place, there must be a fuller recognition of the absolute necessity of maintaining electric railway credit in order to obtain satisfactory operation and service. Under the present system the companies are dependent on voluntary contributions of private capital, and this capital will not be supplied unless the companies are in a position to pay a reasonable dividend and at the same time to lay aside a proper amount for depreciation and other reserve funds in order to prevent an impairment of assets.

Mr. Macleod emphasized the fact, however, that under proper public regulation dividends do not represent profits but merely interest upon invested capital. The man who invests his money in electric railway stock is entitled to the prevailing interest rate for the use of his money equally with the man who makes his investment in the form of bonds. Indeed, in so far as the stockholder assumes the risk of having his principal impaired or entirely wiped out before bonds are affected, he is entitled to something more than the bond interest rate. Public service companies, however, should be so managed and regulated that the risk to the investor and other speculative elements shall, so far as possible, be eliminated, and the dividend return practically limited to the going interest rate. But if the possibility of speculative profit is removed, it is essential that the investment be reasonably secure or private capital will not enter the field.

In the third place, Mr. Macleod pointed out that the effective carrying out of this policy requires a constant equilibrium between the company's revenues and its costs of operation. This in turn implies a greater flexibility in fare adjustments than is practicable under the present system. If there is a proper determination of the amount of the legitimate investment, if provision is made for securing economical and efficient operation and if the element of profit is eliminated, there is no reason why readjustments of rates should involve the delays and controversies which have marked rate proceedings in the past.

The idea that there is some mysterious sanction and virtue in a 5-cent fare, that the price of an electric railway ride should never be either more or less than that amount, although every element in the cost of service is constantly fluctuating, is to Mr. Macleod's mind an extraordinary fallacy, but one that is responsible in large measure for present electric railway troubles. The public must rid its mind of the idea that the revenue requirements of an electric railway are forever fixed by an accident of coinage, and that it is possible to ignore those business laws and economic principles which control all other enterprises. In the absence of any contribution from public taxation, the fare paid by each passenger should be neither more nor less than his proper fractional part of the total cost of operation, and with constant fluctuations in traffic, in the expenditures necessary for labor, fuel supplies and fixed charges, the proper fare for each passenger is bound to be a variable rather than a fixed amount.

#### REMEDIES SUGGESTED FOR MASSACHUSETTS

Mr. Macleod then discussed the service-at-cost plan devised by Homer Loring and described in the *ELECTRIC RAILWAY JOURNAL* of Nov. 17. The commission without expressing any official opinion in regard to the plan and terms of any particular bill embodying this plan, has indorsed the service-at-cost plan in principle, and believes that it should be enacted into law. For most of the important electric railways in the state, Mr. Macleod said, the plan will undoubtedly result in a substantial improvement in present financial and operating conditions, even if it may not in all cases fully restore financial credit and prosperity.

Mr. Macleod then explained why the commission has recommended a special means of settling the difficulties of the Boston Elevated Railway. As noted in the issue of Feb. 9, the essential features of the commission's plan for Boston are full public control, an absolute guarantee of dividends, the possibility of requiring a portion of the cost of operation to be borne out of the general tax levy, and the assurance of comprehensive improvements in existing service and facilities. The special character of the Boston problem, owing to the expensive tunnels and rapid transit lines which form such a large proportion of the Boston Elevated system, is recognized in the existing law under which the rights and obligations of the company in regard to fares and many other matters differ from those of other electric railways. Possibly, Mr. Macleod said, some of the special features embodied in the Boston Elevated plan might also be adopted in the case of other electric railways, but for the present, and until this plan is actually tried, it does not seem desirable to extend its application to all electric railways of the commonwealth.

The construction gang of the Central Kansas Power Company of Gypsum, Kan., recently, with fifteen men, including a foreman, set and tamped 120 30-ft. and 35-ft. creosoted yellow-pine poles in one day. On this job the labor was subdivided as follows: Instead of the erecting gang tamping the poles in as is the usual custom, they did nothing but lift the poles into the holes. Two gangs of tampers of four men each followed. The work was so arranged that each man was kept busy all the time.

# Sliding Scale of Rates Recommended

Percentage of Return Allowed Dependent Upon Economies Effected in Operation—Fixed Rates Unsatisfactory and Contrary to Public Interest

IN VIEW of the interest of electric railway companies in flexible fares, all recognition by commissions of the advantages of the principle of a sliding scale of rates, even when applied to a lighting company, is of interest. A recent decision of this kind is that rendered by the Indiana Public Service Commission "in re the Hydro-Electric Light & Power Company" (P. U. R. 1918-A, page 325). This corporation has a considerable excess capacity over prevailing demands. In formulating a new rate schedule, the commission pointed out that users of current were paying the interest charges upon an investment considerably greater than that necessary to supply their present needs. The development of new business and the more complete saturation of the territory would reduce the cost of energy. It was therefore in the interest both of the utility and of the public that every incentive be given to the utility to develop its business.

With this end in view, the commission adopted a sliding scale of rates under which, for every 10 per cent reduction in rates, the permitted earning power of the corporation should be increased one-half of 1 per cent per annum. At the same time, the commission provided that, if the utility found it necessary to increase rates, the permitted rate of return should be decreased by one-half of 1 per cent per annum for

measured by its own success in creating economies and increasing the volume of business."

The most significant feature of the decision is the recognition of the fact that fixed rates, which can only be changed with the approval of the commission after protracted delay, are unsatisfactory and contrary to the public interest. As the commission remarks, no one can tell what the future holds in store for the utilities. They must be free to act, but, at the same time, a company's self-interest must be made to coincide with that of the public so that rates will not be advanced unless necessary and will be lowered as soon as it is possible to do so.

## Getting More Energy Out of Fuel

IN ONE of a long series of articles on the transformation of energy appearing in the *General Electric Review*, Eskil Berg in the March issue gives some especially valuable data on the results of using high pressure and superheat. Two diagrams are reproduced to depict graphically the results of his analysis.

In Fig. 1 is a half longitudinal section of a steam turbine cylinder in which there are ten expansion stages. At each stage the diagram shows the temperature, steam condition (superheat or percentage saturation) and pressure. The thermometers are so placed that a curve can be drawn through the tops of the mercury columns. Fig. 2 is a summary of the whole subject, indicating how an increase in the working range of temperature increases the heat available for power production. The significance of these curves can

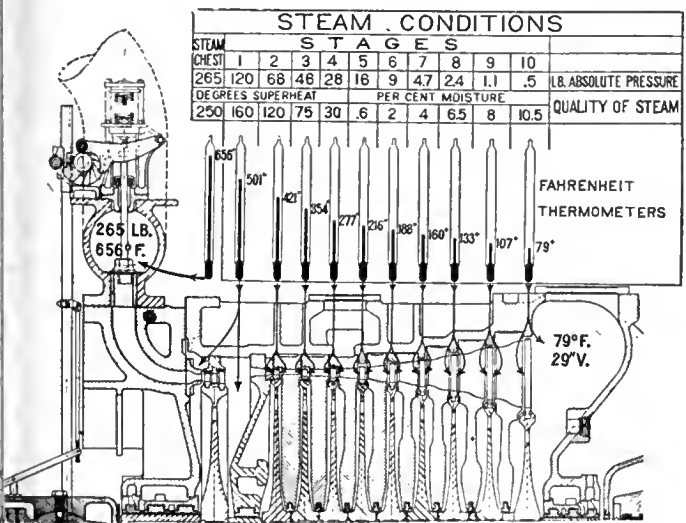


FIG. 1—SECTION OF TEN-STAGE TURBINE SHOWING CONDITION OF STEAM IN EACH STAGE

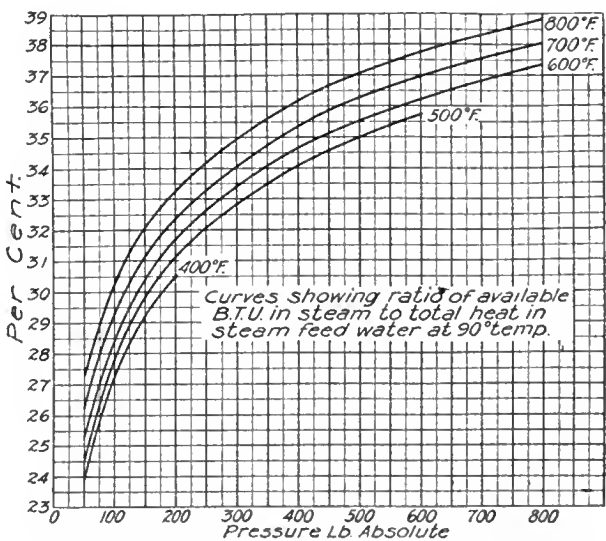


FIG. 2—RELATION OF IDEAL THERMAL EFFICIENCY AND PRESSURE; FEED WATER AT 90 DEG. FAHR.

every 10 per cent increase in the rate. The commission fixed a base rate schedule calculated to produce 3½ per cent on the ascertained valuation of the property and figured that the complete development of the business would enable the corporation to earn a return of 8½ to 9 per cent.

The commission makes it clear that its decision is prompted by a desire to assure to the company "a safe, sustaining rate of return under any conditions that are likely to arise" while at the same time giving to the corporation the strongest possible incentive to strive for an "increased percentage of earnings

be appreciated by reference to the report of tests of the Interborough Rapid Transit 30,000-kw. turbines, abstracted in the issue of the *ELECTRIC RAILWAY JOURNAL* for May 13, 1916, page 903. It must be remembered that of the percentage of heat in the steam given as available all cannot be recovered, as there are radiation and mechanical losses to be provided for. However, in the best modern machines as high as three-fourths of the heat can be changed into mechanical form, or say nearly one-fourth of the heat in the steam coming over from the boilers, with practical pressure and superheat.

## Retail Food Prices Up 39 Per Cent Since 1907

Increase in the Cost of Living, However, Is Not So Great as the Change in Common Index Numbers

THE retail food prices were 12 per cent higher in 1916 than in 1915—a much greater increase than in any other year since 1907. Retail food prices have risen each year since 1907 except in 1911 and 1915, and in 1916 they were more than 39 per cent higher than in 1907. This information is contained in Bulletin 228 of the Bureau of Labor Statistics of the United States Department of Labor, entitled, "Retail Prices, 1907, to December, 1916."

To enable the reader to see the percentage charges more readily, the retail prices of twenty-seven articles of food are reduced to relative prices, the average for 1916 being taken at 100. Individual relative prices have been computed for as much of the period since 1907 as possible, and general weighted relative prices for all combined have been calculated, the price of each article being weighted according to the quantity consumed in the average workman's family.

Every article reported for the period has increased in retail price each year almost without exception save for 1911 and 1915. The general weighted relative prices for all the commodities follow: 1907, 72; 1908, 74; 1909, 78; 1910, 82; 1911, 81; 1912, 86; 1913, 88; 1914, 90; 1915, 89; 1916, 100.

Bulletin 226 of the Bureau of Labor Statistics covers wholesale prices. This shows that the upward movement of wholesale prices which began in the latter part of 1915 continued without interruption through the whole of 1916, becoming most pronounced in the closing months of the year. In December the weighted index number for all the 342 articles studied stood at 118 as compared with 89 in January, indicating an average increase in wholesale prices of nearly 33 per cent. The increase over the level of prices in December, 1914, was more than 49 per cent. During 1916 phenomenal advances were recorded in the wholesale prices of many commodities belonging to the groups designated as farm products, food, cloths and clothing, fuel and lighting, and metals and metal products.

A similar statement, covering a more recent period, has just been issued by a committee of university economists under the leadership of Prof. Irving Fisher of Yale. This committee, acting for the Treasury Department, has been making a study of the purchasing power of money in war time. According to its first statement, the committee has found that the average of wholesale commodity prices in January, 1917, were 81 per cent above that of July, 1914, while the rise in retail prices was 57 per cent.

Commenting upon this statement, the *Engineering & Mining Journal* says in a recent issue:

"This confirms the opinion, not infrequently expressed, that the cost of living has not increased so much as is indicated by the common index numbers, which reflect the basic commodity prices. The individual is more concerned with retail prices, but even they enter but partly into his cost of living. Other things, such as rent and the use of public services, constitute important parts. It is doubtful if rents on the average have in-

creased as much as 57 per cent during the last three years, and it is well known that the charges for public services have increased but slightly in any cases, and not at all in most cases. Therefore, if the finding of Professor Fisher's committee be correct, it is certain that the present cost of living is not 1.57 times that of July, 1914, and that the actual increment is materially less than that."

## Paint Gun Conduces to Economy in the Shop

BY C. M. PETTINGER

Master Mechanic Steubenville, East Liverpool & Beaver Valley Traction Company, East Liverpool, Ohio

MANY progressive electric railway shops are already using paint guns for work which does not require personal touch or which is difficult of access. Many others, however, do not realize the extensive use to which this handy apparatus can be applied with a consequent saving of labor and cost.

We have had a "Spraco" paint gun manufactured by the Spray Engineering Company, Boston, Mass., in our shops for some time and find many profitable uses for



PAINT GUN IN SERVICE WHERE BRUSH WORK IS DIFFICULT

it. Among our rolling-stock units are some modern light-weight steel cars which have been in service for about two years. As the pressed shapes used in the underframe construction as well as the sheets used on the sides are of very light material, they would soon be destroyed if they were not protected by a coating of paint to prevent the rust from attacking the steel.

To protect the underframe of these cars from rust we have inaugurated the following system: All our steel cars, when going through the paint shops, are first jacked up out of doors. After removing the trucks, the entire bottom of the car is thoroughly cleaned with wire brushes, scrapers and compressed air blast, removing all the accumulation of mud and any rust that is found in any part of the underframe. After the car has been thoroughly cleaned it is sprayed by means of the paint gun, using a mixture of red lead and oil.

The cost of applying this paint has averaged about \$2 per car for labor, taking about five or six hours' time at 35 cents per hour. As we have never done this particular work with a brush, it is impossible to give any comparison as to the cost of doing it with a brush and with a gun. It is evident, however, that it would be very difficult to do this particular work with a brush and impossible to do it as efficiently as with the

gun, for the reason that the paint is driven into the recesses and joints that would be hard to reach with a brush.

The paint gun is also used for painting trucks, and we find that it makes quite a saving. Thoroughly to paint the trucks of a double-truck car with a brush requires the labor of one man for three or four hours, while with the gun he can do it in a half hour. The cost, of course, depends on the wages paid the man, but we usually employ an apprentice or laborer for doing this class of work.

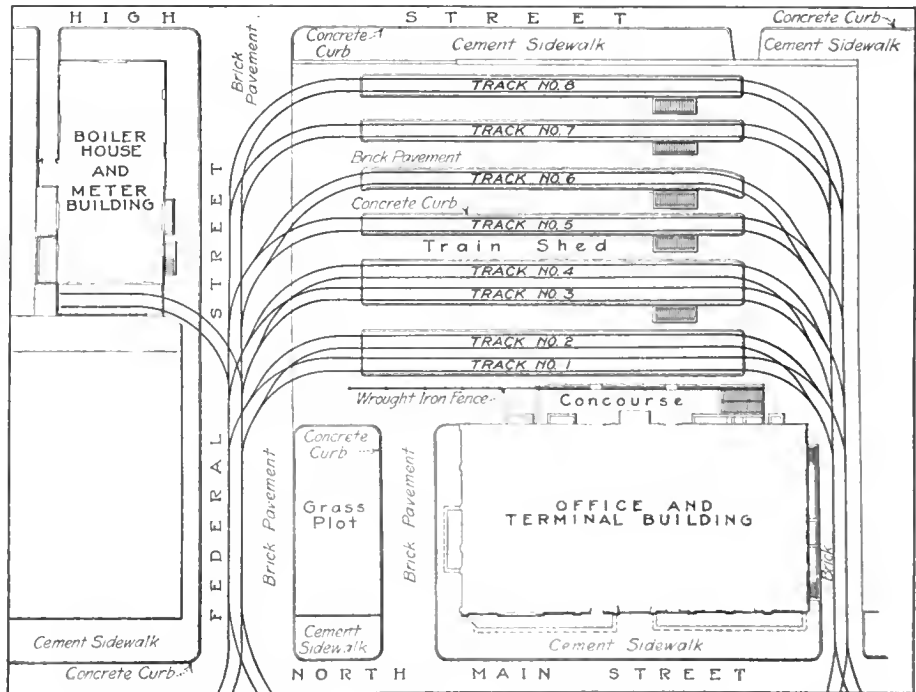
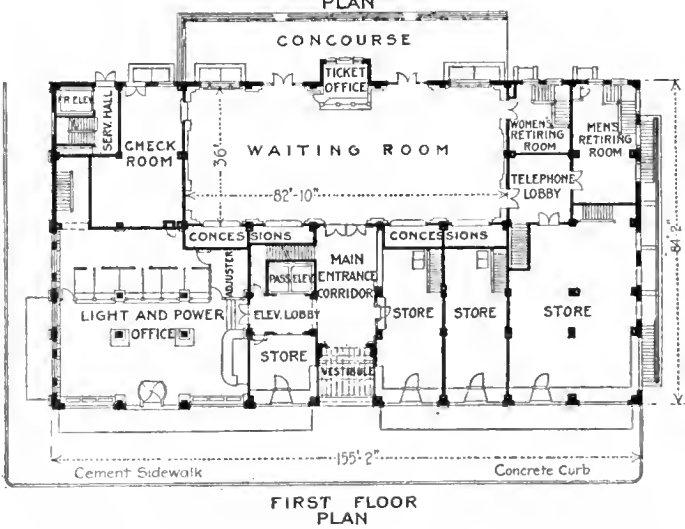
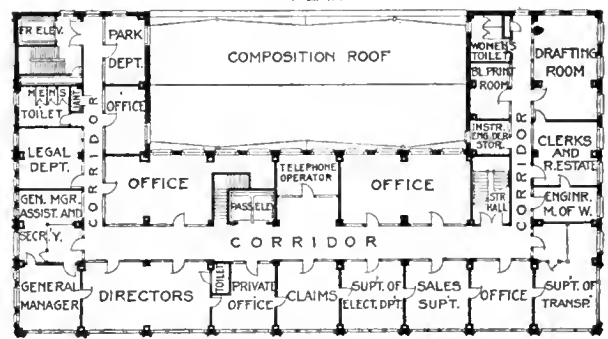
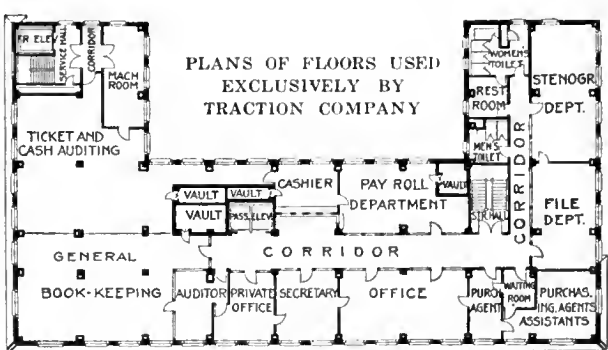
There are, in addition, a great variety of uses to which the paint gun is applicable, such as painting the interior of motors, controller covers, and in fact practically any painting where insulating paint is used.

### New Interurban Terminal Building at Akron, Ohio

THE Northern Ohio Traction & Light Company, Akron, Ohio, now has in the course of construction an attractive new terminal building which will provide a large waiting room and many comforts for the traveling public. There will also be an eight-track train shed of sufficient capacity to shelter at least twenty-four cars. The building is expected to be completed next summer to a temporary height of four stories, the first three of which will be used principally by the traction company and the fourth for general office purposes. The arrangement of the first three floors is shown in the accompanying drawings.

The street side of the first floor will be occupied by stores, with a wide entrance corridor extending back from the center of the building into a large waiting room. The ticket office will be located opposite this corridor, and an exit from the waiting room to the concourse will be made on either side of the ticket office. A tunnel from the concourse will extend along the rear end of the train shed and communicate with the concrete walks between each pair of tracks. The tracks will be built with open-type construction and ballasted with crushed stone. By means of the tunnel and the general arrangement of the station, there will be no crossing of tracks by passengers at any time. The cars entering the station will circle around the rear end over a single track and then turn to the left into the various tracks in the station. The switches for both the incoming and outgoing cars will be controlled from a tower so that any trains can be routed in and out as they arrive without the motorman being obliged to make a number of stops to throw switches.

The new terminal is located on the street which will connect with the new viaduct to be built across the river to the north of Akron, so that ultimately trains will come over this viaduct and directly into the station, without any traverse of other streets in the city.



GENERAL LAYOUT OF TERMINAL BUILDING AND TRAIN SHED



## Women and War Work

The Employment of Women in Transportation Work as Viewed by the Women, the Public and the Labor Union

THE New York (N. Y.) Evening Post has been conducting a series of articles dealing with the new industrial opportunities for women brought about by the change in labor conditions resulting from the war. The scope of these articles, so far as they have appeared, has been devoted largely to the employment by electric railway companies of women conductors and guards. The first of the series was contributed by Col. T. S. Williams, president of the Brooklyn Rapid Transit Company, and was published in the ELECTRICAL RAILWAY JOURNAL for March 2.

The second article by "A Woman Conductor" appeared in the Post on March 2. Some of the points emphasized were that girls seek work in the transportation department because of the novelty of the work, the higher wages received and the "fresh air" claim. The writer of this article states that the girls receive 27 cents an hour and can make \$21 a week working seven days and overtime. The particular run on which she is employed is from 1 to 3:35 in the afternoon and from 7:19 in the evening until 2:29 in the morning. The intervening hours are spent at the carhouse rest rooms, so that the girl is actually away from home about 16 hours. More trouble is encountered from women passengers than men and no ill-treatment is received by the girls from the motorman or men conductors. It is obvious that all of the girls do not have runs like the above, but have more opportunity for home and social life.

The third article, appearing March 4, was contributed by a member of the National Consumers' League. This writer questions the general opinion that there is a shortage of labor and that women are performing a "patriotic service." It is stated that although the wages are higher than women are accustomed to receive, they are conspicuously low in New York for the class of service demanded. Emphasis is placed upon the point that exploitation of women in place of men should be avoided.

The writer believes that inasmuch as night work in practically all industries in New York has been forbidden by law, some legislation should be passed at once to prevent women from being employed on night runs. The fact that the women often have to be on duty 14 hours to get in less than 10 hours' time and that on many cars they have to stand for long periods is also objected to.

The fourth article, which was contributed by the president of the New York Allied Printing Trades Council, appeared on March 5. In this article the writer states that organized labor is not opposed to the employment of women in any occupation which is not detrimental to their health. He brands as false the statement that there is a scarcity of labor and declares that the railways are representing this to be the condition "with the deliberate intention to deceive the public and defraud the unfortunate women who may be induced through 'patriotic' reasons to do their 'bit,' as well as earn a livelihood, by going into occupations that have been exclusively for men in the past." He declares the condition to be a result of the refusal of

railways to pay the men the "prevailing rate of wages." The solution to the problem which organized labor would present is to organize the women into unions for the purpose of exerting collective pressure on the corporations.

## Trend of Labor Decisions

Latest Government Bulletin Shows Important Court Findings About Compensation Laws, Wage and Hour Legislation, and Strike Injunctions

AN UNUSUAL array of important decisions is presented by the United States Bureau of Labor Statistics in its annual compilation of court decisions on labor questions, just published as Bulletin No. 224. A number of the decisions of the Supreme Court of the United States, handed down since December, 1916, are included in this bulletin, but for the most part the decisions were made in the calendar year 1916.

Most notable among the Supreme Court decisions, on account of the circumstances attending the enactment of the law construed by it, is the decision sustaining the constitutionality of the Adamson eight-hour law for trainmen in interstate commerce and declaring at the same time the right of Congress compulsorily to arbitrate disputes between the railroads and their employees for the benefit of the public.

The first broad decisions ultimately deciding the constitutionality of workmen's compensation laws are also noted in this volume. Although a number of state courts of last resort had passed upon laws of this type, it was not until the Supreme Court of the United States had given the seal of its approval that the matter could be considered as finally settled. In upholding the compulsory compensation law of New York and of Washington, the latter also providing for a compulsory state insurance fund, the farthest reach of compensation legislation has received judicial approval. The elective law of Iowa was likewise sustained.

Another important decision by this highest court was that sustaining the Oregon ten-hour day for factory employees without regard to sex or age—a marked reversal from the action of the same court in 1905 in holding the ten-hour law of New York applicable to bakeries unconstitutional. The power of the State to enact laws limiting the hours of service of adult males in private employment, as well as the hours of females and of children, is now recognized. The fixing of wages for women and minors under eighteen is also a valid exercise of the police power according to another decision of this court, the Oregon minimum wage law being left undisturbed in its position of constitutionality as determined by the Supreme Court of that State. On this point the federal supreme bench was equally divided, one justice not voting.

Of hardly less interest than these decisions of the Supreme Court is the action of the court of last resort of Massachusetts in declaring unconstitutional an act which undertook to limit the issuance of injunctions in labor disputes, declaring that injunctions should issue only when property rights are affected and that labor is not property. The court took the view that this attitude excludes from the protection of the law those who have no other property than their right to work, and it held that such a deprivation could not be effected by statute.



# Jitneys in Los Angeles Losing

## Report of Board of Public Utilities Shows Unprofitable Operation on Car-Mile Basis—Many Complaints from Public

JITNEYS in Los Angeles, Cal., are operating at a net loss per car-mile ranging from 0.47 cent in January, 1917, to 0.11 cent in June, 1917. These figures are given in the report of the Board of Public Utilities of that city for the year ended June 30, 1917.

Jitneys began operating in Los Angeles during July, 1914. By the end of 1915 the number had increased to 1300, and it was impossible for the Board of Police Commissioners to regulate them properly under the ordinance in effect at that time. The conditions became worse as time went on, and the city finally passed a restrictive ordinance in October, 1916, placing the jitneys under the supervision of the Board of Public Utilities. In March, 1917, another ordinance was passed increasing the license fees according to the average charges in sixty-two cities. The jitneys operating during the latest check reported on June 25, 1917, numbered 250. Of 323 in service on Jan. 1, only 159 had survived.

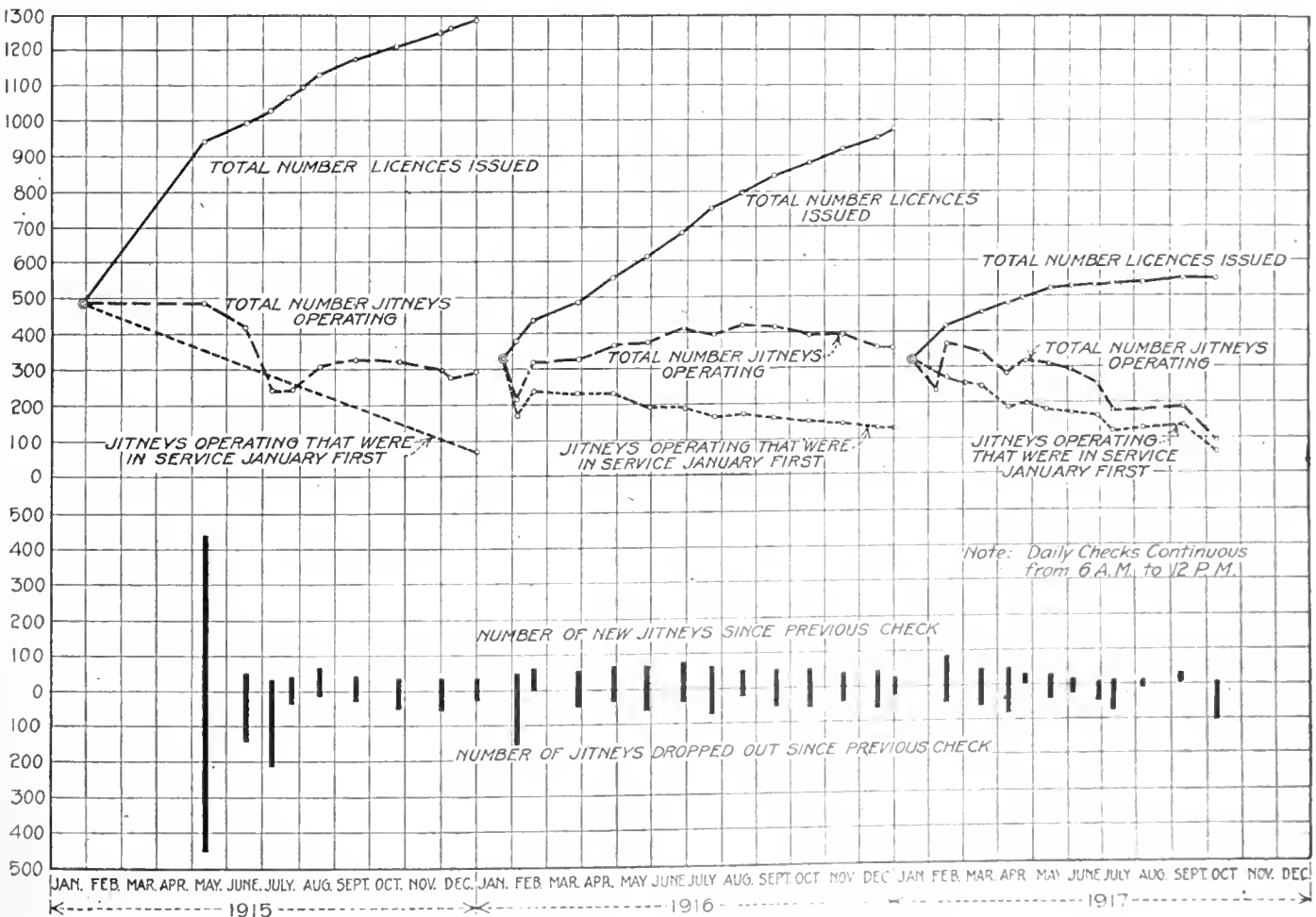
### MANY SERIOUS COMPLAINTS AGAINST JITNEYS

The number of complaints against jitneys for the year ended June 30, 1917, was 1212. The largest numbers of complaints were 268 for reckless and hazardous operation, 129 for deviation from and turning on routes, 119 for discontinuance of operation without cause and 103 for operation without city license and indemnity bonds. Other complaints covered such topics

LOS ANGELES JITNEY OPERATING STATISTICS FOR 1917 (Compiled from Monthly Reports Made by Operators to the Board of Public Utilities)						
	Jan	Feb.	Mar.	April	May	June
Miles run per car.	3241	3057	3641	3330	3641	3649
Passengers carried per car	3330	3353	3660	3651	3941	3920
Passengers per car-mile	1.027	1.095	1.005	1.095	1.081	1.073
Earnings per car.	\$167.66	\$168.98	\$186.69	\$184.60	\$199.04	\$197.64
Expenses per car, exclusive of driver's wages, depreciation and interest	\$93.68	\$92.01	\$98.15	\$101.50	\$100.31	\$105.87
Earnings per car-mile (cents)	5.17	5.51	5.13	5.54	5.47	5.42
Expenses per car-mile (cents):						
As reported	2.89	3.00	2.70	3.05	2.76	2.90
Including depreciation and interest	3.54	3.77	3.26	3.67	3.22	3.43
Including depreciation, interest and driver's wages	5.64	5.87	5.36	5.77	5.32	5.53
Net gain per car-mile (cents)	...	...	...	...	0.15	...
Net loss per car-mile (cents)	0.47	0.36	0.23	0.23	...	0.11

as failure to report accidents (fifteen), drivers charged with crimes (seven), misconduct of drivers towards passengers (seven), drivers smoking on duty (three), short-changing passengers (three), dirty appearance of drivers (two), boisterous and objectionable conduct at terminals (two), excessive fares charged (ten), cars operated without proper sign on windshield (forty-three), and cars operated in unsafe condition (four).

The operating loss of the jitneys during the period from January, 1917, to May, 1917, inclusive, is as shown by the accompanying table. It should be noted that 40 per cent yearly depreciation and 6 per cent interest are allowed on the cost of equipment to the op-



GRAPHIC HISTORY OF THE JITNEY AT LOS ANGELES, CAL.

erator. Drivers' wages average \$2.50 per day, or 2.1 cents per car-mile on a basis of 120 miles per car per day. The accompanying diagrams show how since 1915 the jitney service each year has fallen off as the months passed.

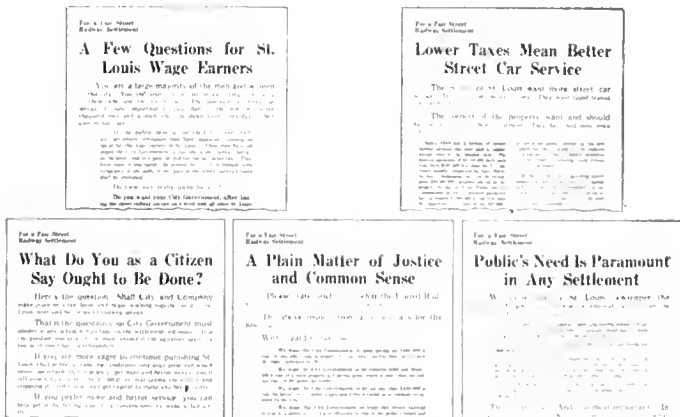
## For a Fair Settlement

St. Louis Company in Series of Advertisements Has Been Securing Public Support in Tax and Franchise Controversies

THE United Railways of St. Louis has been publishing in daily and weekly newspapers a series of forty-five advertisements to procure public approval for a fair readjustment of tax and franchise controversies between the company and the city. These advertisements, which were written by Frank Putnam, appeared during the period from August, 1917, to January, 1918, inclusive. They have now been reissued by the company in the form of a complete set of proof pages, with an index.

In introducing the series of advertisements, some of which are shown in part in the accompanying illustration, the company stated that it wished its customers to know all about the proposed settlement and the electric railway situation generally, so that the great power of an informed public opinion might help to get a fair settlement and open the way for more and better service. The company in subsequent advertisements proceeded to explain the proposed ordinances, the merits of various clauses, the importance of service over taxes and the need of a prompt settlement. It was always ready to answer in detail any queries made by any of its patrons.

The last advertisement stated that there had been a



UNITED RAILWAYS FARE READJUSTMENT CIRCULARS

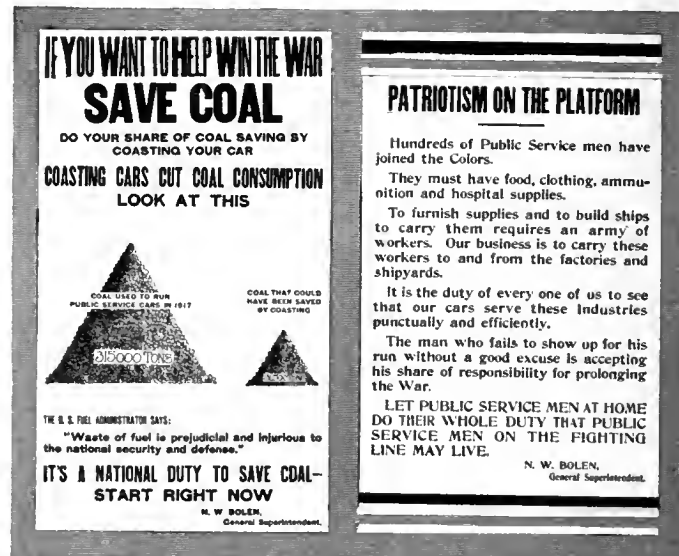
great change in public sentiment during the year, because a large majority of the people now understood that the company needed their good-will, that it was trying to give the most and the best service possible under present conditions, and that any further betterment was impossible until a settlement was effected.

The course of the negotiations in St. Louis has been followed in the ELECTRIC RAILWAY JOURNAL from time to time.

Public Service Commissioner Whitney has written Acting-Mayor Smith that unless the Legislature empowers the commission and the city to make concessions to contractors engaged in building new subways in New York the work will be held up indefinitely.

## Patriotism on the Platform

IN ORDER to impress on its employees their ability substantially to help in carrying on the war the Public Service Railway, Newark, N. J., has posted in its carhouses copies of two posters which are reproduced herewith that they may tell their own story. They have been well received by the men.



POSTER INTENDED TO INCULCATE PATRIOTISM AT HOME AS WELL AS AT THE FRONT

The posters are on white cardboard, 15½ in. x 26 in. in size. The one shown at the right-hand side in the cut is printed in blue and red to enhance the distinctly patriotic character of the text.

## Connecticut Company's Power-Saving Campaign

AS A CONTINUATION of the power-saving campaign described by William Arthur in the March 2 issue of the ELECTRIC RAILWAY JOURNAL the Connecticut Company has just distributed to its platform men copies of a booklet by Mr. Arthur entitled "Trolley-men's Handbook on Efficient Car Operation." This, it is understood, will be available at cost to other electric railways. It is of a patriotic character, outlines general principles and has no reference to any apparatus used in power-saving campaigns. The author is supervisor of coal conservation for the company.

With the booklets the company distributed copies of a leaflet on the coal situation containing a reprint of Federal Letter No. 18 from the United States Fuel Administration to the state fuel administrators. (See ELECTRIC RAILWAY JOURNAL, Dec. 8, 1917, pages 1033 and 1037.) The leaflet also contains the platform man's pledge suggested by the Electric Railway War Board.

## Company Supplies Employees with Fuel

The Georgia Railway & Electric Company, Atlanta, Ga., has made every possible effort to supply employees with coal for home use this winter. According to W. H. Smaw, purchasing agent, the company has delivered coal to many when the fuel was badly needed to keep the steam plants going. Every team which the affiliated gas company could spare was employed in making deliveries.

# American Association News

*EXECUTIVE COMMITTEE of American Association Held Important Meeting at New York on March 5. War Board Announces P. H. Gadsden Will Be Resident Member at Washington, and E. C. Faber, Manager*

*SECTION ACTIVITIES Are Resumed After Lull Caused by Operating Difficulties Incident to Winter of Record-Breaking Severity*

## Changes in the War Board Organization

**P**HILIP H. GADSDEN, president Charleston Consolidated Railway & Lighting Company, Charleston, S. C., has been requested by the American Electric Railway War Board to assume direct charge of the work as resident member. His duties in connection with the financial problems of public utilities will make it necessary for him to remain in Washington most of his time. E. C. Faber, formerly traffic manager of the board, has been appointed manager. W. V. Hill, representative of the electric railways of the State of California, has been appointed assistant manager. The resignation of C. Loomis Allen as director of the board has been accepted as of Jan. 10, 1918.

## Coal for Electric Railways

**T**HE War Board has issued Bulletin No. 12, giving information as to changes in the organization mentioned above and announcing certain changes in the method of handling emergency orders and requests regarding the distribution of bituminous coal made by the department of distribution of the National Fuel Administration. These are as follows:

First, all assignments of men to deal with emergencies affecting particular industries or classes of consumers are hereby canceled, except as they relate to railroad and bunker coal and to coal for gas and by-product plants and for steel and munitions plants.

Second, situations which can be passed upon by state administrators should be, so far as practicable, referred to them for action.

The department of distribution has divided the country into territorial districts grouped as follows:

Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee, Kentucky, Mississippi, Arkansas, Louisiana, Oklahoma and Texas.

Ohio, Michigan, Indiana, Wisconsin, Illinois, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas, Montana, Wyoming, Colorado, New Mexico, Idaho, Utah, Arizona, Nevada, Washington, Oregon and California. New England, New York, New Jersey, Delaware, Maryland and Pennsylvania.

District of Columbia.

The War Board suggests that if relief on coal matters cannot be obtained after conference with state fuel administrators, the War Board office should be communicated with and the matter will be taken up with the manager of distribution.

## October Convention to Be Held

**Executive Committee Favors Meeting But Without Exhibits—Recent Work of Association Committees Reviewed**

**A**T A MEETING of the executive committee of the American Electric Railway Association held in New York on March 5, the principal action taken was a decision to hold a convention next October. The convention will be one for all of the affiliated associations, as well as for the parent organization, but there will be no exhibits. Probably the convention will be two days in duration. No city has been selected as a place of meeting. These details have been left to President Stanley, who will announce his plans later.

The executive committee at its meeting this week also heard a report from Chairman McCarter on the work of the War Board; from J. K. Choate on that of the committee on electric railway revenue, and from P. H. Gadsden on the work of the joint committee with other public utility associations on higher rates. The executive committee also took up the subject of committee work of the affiliated associations. This matter was finally left in the hands of the president to act after consultation with the presidents of the affiliated associations.

A change was made in the rules governing the award for the best paper presented at a company section meeting. Hereafter, no one will be eligible to receive this medal who has the rank of general superintendent or a higher rank than that. The executive committee decided to remit the dues of individual members in military service for the duration of the war. It also approved the following resolution which it asked the Chamber of Commerce to consider at its annual meeting to be held in Chicago on April 10-12:

*Whereas, the maintenance of the country's public utilities in the highest possible state of efficiency is essential not only to the war program of the United States but also to the Nation's business and industrial interests, and*

*Whereas, such efficiency depends upon the preservation of the credit of the companies providing public utility service, and*

*Whereas, the increase of costs and the unusually onerous conditions of operation brought about by the war seriously threaten the ability of the public utilities to continue the furnishing of the necessary services they perform, and*

*Whereas, the protection of the credit of public utilities is very largely in the hands of regulatory commissions and other public authorities rather than in the utilities themselves, therefore be it*

*Resolved, that the Chamber of Commerce of the United States of America recommends to the state and local authorities that they recognize the unusual and onerous conditions with which public utilities are contending, and that in the interest of the nation, of business and of the public, they give prompt and sympathetic hearing to the petitions of such utilities for assistance and relief.*

Those in attendance were: President John J. Stanley; Vice-Presidents John H. Pardee and T. S. Williams; members of executive committee, M. R. Boylan, R. E. MacDougall, Thomas Finigan and John G. Barry, who represented E. W. Rice, Jr. Past-Presidents McCarter, Sergeant, Storrs, Ely and Henry were present, as were also P. H. Gadsden, J. K. Choate and C. C. Peirce, on invitation.

## Some Startling Data Presented at Public Service Meeting

THE meeting of the Public Service Railway company section held on Feb. 21 was an "economy" meeting in that all of the discussion centered around the necessity for doing things which will offset the rapidly mounting cost of operation. Martin Schreiber, chief engineer, read a carefully prepared paper on "Some Problems of the Railway Business." R. E. Danforth, general manager, gave a forceful talk on the seriousness of the situation confronting the electric railways. He read a letter from a prominent steam railroad man commending Public Service Railway for its service on one line, and he stated that he believed that this particular line was no more worthy of commendation than many others. Mr. Danforth attributed much of the

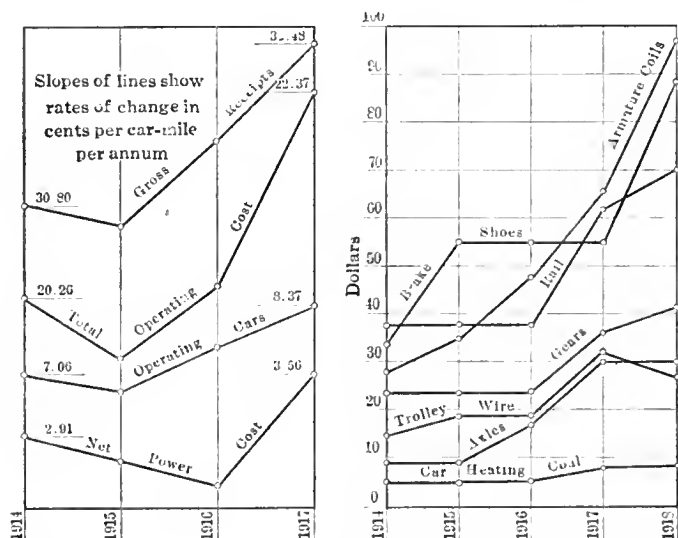


FIG. 1—DIAGRAMS TO SHOW RATES OF CHANGE OF ELECTRIC RAILWAY INCOME AND COSTS. FIG. 2—DIAGRAM SHOWING HOW MATERIALS COSTS HAVE INCREASED IN FIVE YEARS

present difficulty in maintaining equipment to the frequent labor turnover. Further, he urged that never was it more important for the men to be careful of the equipment, as it is almost impossible to get supplies. Not only are parts such as car wheels, field coils, etc., very scarce, but operating conditions tend to use them up more rapidly than when they are plenty. For example, recently a supply of 1600 car wheels was received by the company, but in four weeks they had all been used.

Mr. Danforth said, however, that while conditions are bad they will not compare with those in the trenches at the front, and the men should do their work willingly and cheerfully.

J. W. Brown, assistant superintendent, spoke on the subject of optimism. He explained that the railway was pulling out of the worst winter in thirty years, the average temperature for the winter being 25 deg., as compared with the general average of 34 deg. for December; that one snowstorm had cost the company \$140,000, and that there was a large loss of men from the service. Nevertheless he held that the future is bright. He urged all of the men to work, not in a spirit of hopelessness, but in one of cheer and courage.

Taking up Mr. Schreiber's talk more in detail, it may be said that it centered around the two charts reproduced. Fig. 1 shows the rate of change of gross re-

ceipts per car-mile and total operating costs, and two of its components. The diagram is arranged for comparison of the slopes of the lines and not of their absolute values. Mr. Schreiber went into some detailed explanation of the reasons for the depressions in the graphs, which had to do with increase in schedule speeds, commissioning of a new power plant, etc. He emphasized the fact that when the slope of the cost line is equal to or greater than that of the receipts the situation requires careful attention.

The second chart shown by Mr. Schreiber, Fig. 2, shows how the costs of materials have been going up. Advantageous contracts held some of these costs to a lower rate of increase than they otherwise would have had. This chart is based on an analysis of \$400,000 worth of materials purchased.

Because of the difficulties encountered in making ends meet, Mr. Schreiber emphasized the necessity of the measures which are being taken to increase economy and urged hearty co-operation on the part of all members of the company's organization.

## Milwaukee Holds "Electric Court" on Attorneys' Night

THE regular meeting of the Milwaukee Electric Railway & Light Company section was held on Feb. 14 with an attendance of two hundred. This being attorneys' night the scene was that of a court room and a fake complaint was prearranged, involving serious charges against the attorneys. A full court and jury was provided and the regular court form adhered to. The defendants were found guilty and the judge, being unable to pass sentence, discharged them.

After court dismissal the following talks were given: "Why Public Utilities Differ from Other Industrial Enterprises," by Attorney E. S. Mack; "Public Prejudice Against Street Railways," by Attorney C. Nuskat; "Closer Relations of Company to Employees," by Attorney J. D. Shaw; "Some Cases in Court," by Attorney Drew; "Paving," by Attorney J. C. Hardgrove; "Street Car Service," by Attorney W. A. Jackson.

G. T. Seely of the Chicago Elevated Railway was present and spoke briefly regarding the local car service.

## History Reviewed at Portland Dinner

THE Cumberland County Power & Light Company section held its regular meeting on Feb. 18 and dinner was furnished by the company. A. H. Ford made a few remarks on the 6-cent fare case, which was shortly to come before the Public Utilities Commission. C. F. Berry, treasurer, and one of the oldest men, as regards years of service, in the employ of the company gave a history of the Portland Railroad from the beginning of horse-car operation.

The company section orchestra furnished music and Deane Payne, a local newspaper man, entertained with stories.

The American Museum of Safety, which in normal times awards annually the Anthony N. Brady and other medals for achievement in safety work, will not make any medal awards this year. This step has been taken as a war-time economy.

# News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

## Transit Commission Cases Heard

**Supreme Court of Ohio Asked to Pass on Acts Creating Cleveland Transit or Subway Commission**

Two cases affecting the Cleveland subway or rapid transit commission were argued in the Ohio Supreme Court on Feb. 19. One of them, filed by Prosecuting Attorney Samuel Doerfler, asks that the commission be ousted. The other, entered by City Law Director W. S. Fitzgerald, asks that C. J. Neal, city finance director, be restrained from paying the expense of the commission. Mr. Doerfler is said to be in earnest in his contest, but the other suit is a friendly one, intended to establish the constitutionality of the law under which the commission is established. A similar suit from Cincinnati is pending.

Former Appellate Judge Walter D. Meals and former Municipal Judge Pierre A. White appeared for the commission. Attorneys for the city and county argued that the Bower act, under which the commission was appointed, is unconstitutional and that no provision was made for it in the city charter. Judge Meals declared that the subway commission ordinance is constitutional and is the freest exercise of home rule imaginable. The charter was adopted as a home rule proposition.

It was contended by some that a charter amendment, instead of the ordinance, should have been submitted to a vote of the people and that in its present form there is no authority for the commission.

## Rebuilding Trenton Carhouse

The Trenton & Mercer County Traction Corporation, Trenton, N. J., has arranged for the rebuilding of its car-

house destroyed by fire recently. Newton A. K. Bugbee & Company, Inc., will do the steel work on the new structure; Edward La Rue the carpentry and Burton & Burton the mason work. The loss to the company through the destruction of the old building was estimated at \$65,000. Three new cars and two old ones were destroyed and five others were damaged. An idea of the damage to the building and its contents is conveyed in the accompanying illustration.

## London Purchase Agreement

The directors of the London (England) United Tramways have signed an agreement with the County Council, "settling all matters of difference," with reference to the purchase by the Council of the company's tramway undertaking in Hammersmith. Under this agreement the Council will pay to the company the sum of £235,000 "in satisfaction of all the items" included in the arbitrator's award, dated Feb. 12, 1912, which, until the signing of this agreement, has been the subject of litigation. Included in this purchase money is the Chiswick power station and depot of the company. The purchase money is to be paid on or before the expiration of one year from the termination of the present war, but until the purchase money is paid the company is to remain in possession of the purchased tramways and to take the receipts thereof for the benefit of the company. From and after the completion of the purchase the Council and the company are to have reciprocal running powers over the lines of the other, and the present arrangement between the company and the railway for through bookings at Shepherd's Bush and Hammersmith are to be continued by the company until the completion of the purchase.

## Local Transportation Provision

**Bill Before the House Would Provide \$50,000,000 for Housing and Local Transportation**

The committee on public buildings and grounds has favorably reported to the House of Representatives a bill authorizing the expenditure of \$50,000,000, through the Secretary of Labor for the purpose of providing housing, local transportation and other community facilities for war needs. If the bill passes Congress, as it is expected it will, in view of the fact that it is an administration measure, the necessary money must be appropriated in an appropriation bill, following the passage of an authorization.

The report on the bill calls attention to the fact that it "gives to the Secretary of Labor the power to acquire by purchase or otherwise such local transportation and other community facilities, or parts thereof, and equipment, as in his judgment may become necessary for the proper execution of the trust created."

The committee's report in conclusion says, in part:

"Necessarily legislation of this character must lodge very broad discretion with those who are to administer it. It is a temporary expedient, and entirely new to our government, and, as we stated in the beginning, can only be justified by the conditions now existing, but those conditions seem to us to imperatively demand its enactment."

## Tacoma Purchase Vote on April 2

At the municipal election in Tacoma, Wash., on April 2 a proposition will be submitted to vote \$6,500,000 of utility bonds for the acquisition by condemnation or stipulation of the entire electric railway system of the Tacoma Railway & Power Company by the city of Tacoma. U. E. Harmon, city attorney, has been authorized to draw up an ordinance for presentation to the City Council, placing the proposition on the ballot at the spring election. It is proposed to vote approximately \$6,000,000 for the actual purchase of the system and \$500,000 for repairs and rehabilitation of rights-of-way and the purchase of additional equipment. Commissioner Atkins points out that the voting of utility bonds would not mean any increase in taxes, as the money to meet principal and interest on the bonds would come from the returns on the city's utilities. Mayor Fawcett of Tacoma opposes the plan to vote a \$6,500,000 bond issue. He asserts that the figure is double the value of the properties.



REMAINS OF TRENTON CARHOUSE



## Massachusetts Governor's Relief Message

### Immediate Readjustment of Fares for Boston Elevated Urged by Governor After Recent Labor Settlement

Governor McCall of Massachusetts, in a special message to the Legislature on March 1, recommended an immediate readjustment of fares on the Boston Elevated Railway, to continue in force during the war and for one year thereafter, in order that the company may be provided with the funds necessary to meet the wage increase granted as a result of the threatened strike of employees. The Legislature is studying electric railway finance, but the Governor believes immediate steps should be taken to meet the situation arising from the war crisis and the differences between the company and its employees.

#### GOVERNOR'S SECOND RAILWAY MESSAGE

The message of March 1 is the second the Governor has sent to the Legislature on matters pertaining to the finances of the Boston Elevated Railway. On the closing day of the 1917 session, the Governor anticipated the passage of a bill to provide for purchase by the State of the Cambridge subway, and sent a special message to the Legislature expressing disapproval of that act. In his message at that time, Governor McCall recommended the enactment of legislation which would give the Public Service Commission power, after investigation, to abrogate the contract made between the State and the elevated in 1897, under which a maximum fare of 5 cents could be charged on the company's lines. The Legislature refused to enact a law, but adopted an order directing the Public Service Commission to report to the Legislature this year on the financial condition of the company. The report of the commission is now pending before the committee on street railways, as is also a report of a special recess committee on the electric railway situation throughout the State.

The Governor's message of March 1 to the Legislature, is as follows:

#### SITUATION SERIOUS

"A serious condition which in my opinion demands your immediate consideration, exists upon the Boston Elevated Railway. During 1916 a contract was entered into between the railway and its employees, fixing a scale of wages for a period of three years. Since the contract was made the cost of living has increased rapidly so that the wages fixed in the contract do not amount to-day to a living wage, especially in the case of an employee with a family to support. The men demanded an increase. The railway on the other hand had only such income as the law permitted it to receive. The cost of the operation of the road has also increased greatly, and it is claimed that the fare it receives to-day is inadequate to enable it to render efficient service as a common carrier even upon the scale of wages fixed in the contract. I do not believe that the public desires

transportation which must be furnished in considerable part at the expense of men who are underpaid, or any transportation, the fair cost of which it does not pay, but which must in part be paid by somebody else.

#### FARE FIXED TWENTY YEARS AGO

"The present fare was established by the Legislature some twenty years ago, and only the Legislature has power to deal with it now. This fare was fully adequate at the time it was established and for many years afterward, but it is very widely claimed that it is inadequate in the conditions that now exist. I imagine it will not be disputed that the railway should be permitted to receive an income which with economical management will enable it fairly to perform its obligations as a common carrier. More than that it should of course not be permitted to receive. But less than that means poor service, underpaid employees, and ultimate bankruptcy. The Legislature, I am informed, is considering the general question of electric railway transportation both within the city of Boston and outside of it. But something should be done immediately to meet the conditions existing in Boston; and it may be done without prejudice to any of the propositions which the Legislature is now considering, as a method of dealing with the existing emergency.

#### IMMEDIATE ACTION NECESSARY

"I recommend that anything in the charter of the railway or in the law to the contrary notwithstanding, our Public Service Commission during the continuance of the war and for one year thereafter, or until the Legislature shall otherwise provide, be given power to fix just, reasonable, and equal rates of fare upon the Boston Elevated Railway; and pending a hearing upon any application for change of rates, that the commission shall have power from time to time to fix interim rates to have force and effect until they shall finally make decision upon the application. It is, of course, not possible to foretell how long the present abnormal conditions regarding prices will continue after the war, but we may follow the analogy of the bill providing for the taking of the railroads for war purposes by the national government. Of course if conditions during the time proposed should warrant a decreased fare, it would be the duty of the Public Service Commission to establish it. I am convinced that immediate action on this subject is necessary in the interest of the public as well as those who own and operate the elevated railway."

The message was referred to the committee on street railways, and that committee arranged to begin hearings on March 5.

Governor McCall, at his noon conference with the State House reporters, following the reading of his message

in the House, said, in answer to questions:

"I have been contemplating seriously my action of to-day for a long time. Since Monday my conviction that something should be said along the line of what I have now said in my message has become acute. I made up my mind that now was the time to say it. But I believed that I ought not to say it until this threatened strike was disposed of, lest the two be linked together in the public mind. So I kept my intention secret."

At the hearing before the committee on street railways on the Governor's message counsel for the company stated that it preferred the cost-plus proposition as suggested by the Public Service Commission rather than the plan laid down in a general way by the Governor. The road preferred, if relief was to be given, that it have a tendency toward permanency.

## Praise for President Ahearn

Thomas Ahearn, president of the Ottawa (Ont.) Electric Railway, had some very complimentary things said about him and the company of which he is the head by the daily press recently. One paper remarked:

"The Capital City is fortunate in being served by a railway of undoubted excellence. This is due in no small degree to the organizing ability and the executive genius of Thomas Ahearn, president of the company, who has himself taken a personal interest in everything relating to the railway and the men who work for that corporation. It is rarely that any friction arises between the company and the municipal corporation, and everybody in Ottawa is proud of its street railway service."

## Major Belmont Takes a Hand

Major August Belmont, chairman of the board of the Interborough Rapid Transit Company, New York, N. Y., played an important part in the work of arranging the trade agreement by which some of the needs of the American forces in France will be supplied from Spain. His work is described by *Financial America* in part as follows:

"General Pershing soon found that many supplies he had been buying in Spain were not being delivered.

"The United States then stopped licensing exports to Spain. Then General Goethals selected Major August Belmont to aid our Ambassador in negotiations. When America entered the war, Mr. Belmont offered his expert knowledge of horses and business to the government. He received a commission as a horse buyer for the army.

"When General Pershing's difficulty arose Major Belmont was sent to Spain and on his recommendation a deal was made by which a reasonable amount of petroleum, cotton and other needs of Spanish industry will be allowed to be exported from America, together with equipment for Spain's much neglected railroads. General Pershing, in return,

will be allowed to draw on Spain's surplus products for his supplies. This checks Germany's evil influence with a friendly neutral, enlarges our source of supplies and also saves in ships, the exports to Spain occupying less cargo space than the bulkier products needed by General Pershing, which otherwise must be sent from America."

## Fuel Priority Revoked

### Administrator Garfield Suspends Provisions of Order of Jan. 17 Relating to Utilities and Other Industries

United States Fuel Administrator Garfield on March 5 issued an order revoking Sec. 1 of the regulation promulgated on Jan. 17, in all states east of the Mississippi except Pennsylvania, Maryland, West Virginia, Ohio and eastern Kentucky. The order, effective on March 5, suspends certain provisions relating to priority in furnishing coal to public utilities, railroads, domestic consumers, army and navy cantonments, hospitals and other preferred consumers.

#### REGULATION CONTINUES IN FIVE STATES

The five states in which the regulation continues in full force embrace the anthracite and bituminous producing fields which supply the eastern section of the country, and coal operators therein will continue to give preference to shipments for consumers in the order named in the regulation. It is also provided that in those states the provisions of Sec. 1 shall be extended to include contracts for coal made or accepted after Jan. 17, as well as contracts and orders on hand on that date.

The provisions of Sec. 1 of the order of Jan. 17 were:

Until further order of the United States Fuel Administrator, all persons selling fuel in whatever capacity, shall, in filling their contracts or orders now on hand, give preference to necessary current requirements of: Railroads, domestic consumers, hospitals, charitable institutions, army and navy cantonments, public utilities, by-product coke plants supplying gas for household use, telephone and telegraph plants, shipping for bunker purposes, the United States for strictly governmental purposes (not including factories or plants working on contracts for the United States), manufacturers of perishable food for necessary immediate consumption and municipal, county or state governments for necessary public uses. Any tonnage remaining after the foregoing preferred shipments have been made may be applied to filling any other contracts or orders.

#### SITUATION GREATLY IMPROVED

Improved transportation conditions and other helpful factors have contributed to a material improvement in the coal situation in the territory where the coal priority list has been suspended. It was deemed to be no longer necessary because the flow of coal into those states is sufficient to meet normal needs.

Continuance of the order for a longer period would have resulted in the accumulation of reserve stocks of coal for the consumers benefited by priority. In the states where the regulation will continue to operate the car shortage has not been entirely overcome.

## San Francisco Traffic Needs

### City Engineer O'Shaughnessy Discusses Question of Financing and Extension of Municipal Railway

City transportation problems were discussed at length at a recent meeting of the San Francisco Commonwealth Club by M. M. O'Shaughnessy, city engineer. Judging from annual receipts of street railways, and taking the population at 550,000, he stated that San Francisco afforded the greatest patronage per capita of street railroads of any city in the United States. The receipts of the railways he estimated to be \$20 per head a year, or a total of \$11,000,000 a year.

#### MATTER OF EXTENSIONS A PROBLEM

In referring to the plan to build the outer tracks down Market Street, he said this was being done not because it was desirable so much as because it was the only thing to do unless elevated or subway lines were built. The two tracks now used were insufficient to carry the traffic, and would be less able to do so as the population increased.

According to Mr. O'Shaughnessy, one of the problems to be solved in directing the affairs of the municipal system was to decide the question of extensions. Applications were being constantly received for the extension of the system, but care was being taken to see that extensions were made only where additional facilities were really needed. For example, there were now three lines in the Richmond District only one block apart, while the industrial area south of the Union Iron Works, which is becoming well populated, was not served at all. Attention was therefore being given to possible connection with crosstown lines that would serve that section.

#### WOULD RECAPTURE BAY TRAFFIC

With regard to other extensions of the municipal system, Mr. O'Shaughnessy pointed out the desirability of trying to recapture traffic, estimated at 60,000 persons a day, now taken across the bay. He would do this by improving facilities for reaching desirable sections down the peninsula. A connection with San Mateo County on good grades and curves, by way of the Twin Peaks Tunnel, was thought to be entirely feasible, and a broad right-of-way was advised. The desirability of buying a right-of-way 300 ft. wide between Mission and Howard Streets from Fourteenth to Twenty-fifth, was mentioned. It was pointed out that an elevated line for rapid transit could be built down the center of such a route while provision for surface boulevards could be made on either side. This wide strip would have a great advantage as a fire protective measure, particularly desirable in that quarter of the city.

The bond limitation upon the city would have to be enlarged in order to accomplish the several transportation extensions which were likely to become necessary. At the present time the

maximum of 15 per cent on the assessed valuation of \$600,000,000 gave only \$90,000,000 maximum for the purchase of utilities. Of this, \$44,000,000 was now outstanding, leaving only \$40,000,000 to complete the Hetch Hetchy scheme, to purchase Spring Valley, and provide for transportation. Since San Francisco was irrevocably given to public ownership of utilities, a way must be found to permit acquisition beyond these limitations, and to this end Mr. O'Shaughnessy was of the opinion that the charter must be readjusted by putting a limitation of say 8 per cent on non-earning utilities such as schools and parks, then removing the limitation on self-supporting utilities. Mr. O'Shaughnessy was in favor of extending the boundaries of San Francisco and consolidating public utilities.

## Help the Red Cross

### Unselfish Action of Southern Public Utilities Employees Commended by Public and Press

Early in December there came to Z. V. Taylor, president of the Southern Public Utilities Company, Charlotte, N. C., from various cities and towns served by that company, suggestions that the annual banquet to the employees be called off and the funds donated to the American Red Cross. President Taylor directed that a referendum vote of the employees be taken, and as a result it was found that 99.93 per cent of the entire organization favored giving the funds to the Red Cross.

#### \$1546 TO RED CROSS

The company, with which the Southern Power Company is affiliated, ascertained that the average cost per man for the banquet was about \$3, so that it was decided that each man should receive a year's membership in the Red Cross, a paid-up subscription for the *Red Cross Magazine*, each costing \$1, and that the remaining \$1 be donated to the various chapters in the cities and towns in which the employees are located, for work either locally or nationally, as the chapter deemed expedient. In this way 1546 new members were added to the rolls of the Red Cross, this number of new subscriptions was turned over to the *Red Cross Magazine* and a similar amount of money, \$1,546, was turned into the various local Red Cross Chapters in North and South Carolina.

#### MANY EXPRESSIONS OF GOOD-WILL

In his letter of New Year's greeting to the employees President Taylor complimented the employees on their action in voting to give up the banquet this year for the Red Cross.

The publication of these facts in the various newspapers in territory served by the companies brought out many expressions of good-will.

## News Notes

**Roof of Car Blown Off.**—During the windstorm and blizzard on Feb. 26 the roof of a car on the Rome (N. Y.) Railway was blown clean off and fell in the street by the side of the track.

**Eighteen Cars Destroyed.**—Eighteen double-truck cars of the Public Service Railway were destroyed by fire on March 3 and the carhouse at Camden, N. J., was badly damaged. The loss is estimated at about \$150,000.

**Winnipeg Men Ask Increase.**—The trainmen in the employ of the Winnipeg (Man.) Electric Railway have asked the company for an increase in wages of from 2 to 3 cents an hour, effective from May 1. The present scale calls for wages from 28 cents an hour for the first six months to 36 cents an hour for the third year.

**Fort Dodge Officials Complete Tour.**—G. T. Motz, purchasing agent of the Fort Dodge, Des Moines & Southern Railroad, Boone, Iowa, and J. N. Duncan, master mechanic of the same railway, have finished their tour of inspection of the Illinois Traction System shops and power plants, as well as of track and line conditions.

**Wage Discussion Awaits Fare Award.**—Following a conference on March 2 between officials of the United Railways, St. Louis, Mo., and representatives of the newly formed union, it was announced that negotiations relative to the demands for higher wages will be put over until such time as the Missouri Public Service Commission decides whether the company may increase its revenue.

**Tax and Fare Cases Set for March 13.**—Hugh M. Caldwell, corporation counsel of Seattle, Wash., has been advised that March 13 has been set for arguing before the Supreme Court the case of the Puget Sound Traction, Light & Power Company for the collection of the 2 per cent tax on 1916 railway revenues. The 4-cent ticket case, decided against the city by the Superior Court of Thurston County and appealed by the city, has also been set for March 13.

**Agreement Reached on Lay-Offs.**—Officials of the Rhode Island Company, Providence, R. I., and the union of employees have reached an agreement for the payment of platform men for the lay-offs resulting from the discontinuance of all-night schedules. The company has agreed to pay the men for the time they lay off at the carhouse as if they were on trips. It is part of the agreement, however, that these men are subject to call and can be used for any work performed by platform men.

**Increase in Wages in Galveston.**—Trainmen in the employ of the Galveston (Tex.) Electric Company and of the Houston (Tex.) Electric Company, have received wage increases. The raise amounts to 2 cents an hour and will make the schedule range from 27 cents an hour for men in their first year to 32 cents an hour for men in their fifth year. The same scale is announced for both Galveston and Houston. This is the fourth voluntary increase granted by the companies within the last two years.

**Hudson Tunnel Bill Signed.**—Governor Edge of New Jersey has signed the three bills formally launching the interstate projects of linking New Jersey to New York City by a vehicular tunnel under the Hudson River and connecting New Jersey with Pennsylvania by a bridge over the Delaware River between Camden and Philadelphia. It has been estimated that the cost of the tunnel and bridge will be approximately \$25,000,000, of which New Jersey will pay half. New York will spend about \$6,000,000 as her share of the tunnel work.

**Sees Help in Electric Railways.**—The use of the electric railways of New Jersey for carrying freight and the construction of a barge canal from the Hudson River at Piermont, N. Y., to the Hackensack River at New Milford, N. J., are among suggestions made by Archibald N. Jordan, to the New York-New Jersey Joint Port Improvement Commission. Mr. Jordan also suggests that as a part of a general plan to relieve the present congestion of freight in the New York district, the abandoned piers at Piermont and Sandy Hook should be immediately rebuilt and extended to provide for the export of army supplies.

**Recommends Putting Off Transit Construction.**—W. S. Twining, director of city transit of Philadelphia, Pa., has recommended to Mayor Smith the abandonment, during the war, of the extensive high-speed transit program to be constructed out of the city loan for \$67,100,000, authorized on June 19, 1916. Action will probably be taken on the recommendations shortly, but it is planned that the work on the contracts held by the Keystone State Construction Company will not be started. This company has the awards for the subway lines south from City Hall to Pine Street and north from City Hall to Buttonwood Street. The two contracts aggregate \$6,000,000.

**Would-Be Regulator Has Change of Heart.**—The elaborate measure for regulation and prospective purchase by the city of the properties of the Louisville Railway introduced by Alderman W. H. Zeiser, in the General Council at Louisville, Ky., has been withdrawn by its author. In withdrawing the bill the Alderman stated that he did not believe Louisville was ready for the reforms and also that he did not think the railway was in position to stand the extra expense that would attach to the operation of the measure. Some of the things which the painter-regu-

lator sought to bring about were referred to in the *ELECTRIC RAILWAY JOURNAL* of Feb. 9, page 291.

**Discharge of Employee Sustained.**—A board of arbitration has approved the action of the Cleveland (Ohio) Railway in the discharge of Motorman Louis Yellon, whose car ran down and killed another employee of the company. The claim was made by Yellon that the accident was due to a frosted window. The board recommended that Yellon be employed in some other capacity by the company if he asked for it, and that further study be made of plans for preventing windows in the vestibules from frosting. Miss Florence Allen, attorney and suffragette, was chosen by the men as a member of the arbitration board to decide the matter.

## Programs of Meetings

### New England Street Railway Club

The eighteenth annual meeting and dinner of the New England Street Railway Club will be held at the Copley-Plaza Hotel, Boston, Mass., on March 28. The club has secured John W. Weeks, United States Senator from Massachusetts, and Thomas N. McCarter, chairman of the Electric Railway War Board and president of the Public Service Railway of New Jersey, as speakers for the meeting. Guy A. Ham will preside as toastmaster. The club urges those who plan to attend to make their reservations at once.

### New York Railroad Club

The fourteenth annual electrical night of the New York Railroad Club will take place on March 15. The subject is: "Recent Electric Locomotive Design." Edwin B. Katte, chief engineer electric traction of the New York Central Railroad, and chairman of the committee in charge, has announced the following program:

The New Haven Railroad's new 180-ton passenger locomotive; to be described by F. R. Hill.

The St. Paul Railroad's new gearless, bi-polar passenger locomotive under construction by the General Electric Company, will be described by A. H. Armstrong, with lantern slide illustrations from photographs of the general drawings.

The St. Paul Railroad's new quill-gear locomotive under construction by the Westinghouse Electric & Manufacturing Company, will be described by F. H. Shepard of the Westinghouse Company and illustrated by lantern slides.

The New York Central Railroad's latest electric passenger locomotive will be briefly described by Mr. Katte and illustrated by lantern slides.

There will also be moving pictures showing a heavy steam passenger train on the New York Central arriving at Harmon, the electric terminal. An electric locomotive will be shown being attached to the train, and the train will later be shown under electric operation.

# Financial and Corporate

## Port Arthur Loses Money

The Net Loss on All Municipal Undertakings for the Year Was \$55,425

In 1916 2,748,213 passengers traveled on the cars of the Port Arthur (Ont.) Municipal Railway. On July 25, 1917, the railway fares in the city were reduced. On the main line the rates are doubled at the boundary between Port Arthur and Fort William. During 1917 tickets totaling 3,246,953 were sold.

On the main line, as well as on each belt line, the number of passengers traveling steadily increased each month, but the increase was not sufficient to make up the decrease in the price of tickets within the city. The main line, however, made up at least \$2,000 each month since the change.

The electric railway revenue in 1917 amounted to \$125,000, being an increase of \$19,000 over 1916. The net deficit on the railway, however, was \$8,000 less than in 1916. The net earnings exceeded the operating expenses by \$23,000, but this excess was not sufficient to clear the interest on investment, depreciation charges and in sinking fund payments.

To sum up the position as regards public utilities during the last year Port Arthur faced a loss on its railway, telephone and water, and had a surplus on its light and power and Current River improvement accounts, the net loss for the year being \$55,425.

## Dallas Return 4½ Per Cent

An approximate annual return of 4½ per cent on the fixed valuation was shown by the Dallas (Tex.) Railway during the three months ended Dec. 31, 1917, according to the report just filed with the City Commission. The new service-at-cost franchise permits the company to make a return of 7 per cent. The report shows a total balance of \$22,241.88 available for authorized return. A summary follows:

Gross earnings:	
Railway .....	\$126,523
Interurban terminal .....	9,103
Total gross earnings.....	\$135,627
Operating expenses, plus appropriations to reserves:	
Railway .....	\$108,086
Interurban terminal .....	5,298
Total .....	\$113,385
Balance available for authorized return .....	\$22,241

## Commissioners Confer on Finances

Travis H. Whitney of the Public Service Commission for the First District of New York went to Washington recently for a conference between the special war committee of which he is a member and state commissions throughout the country. The principal

purpose of the conference was to express the attitude of the national government on the matter of the issuance of securities by public service corporations so that the various state commissions may work in harmony with the federal authorities. It is the desire that expenditures for public utilities shall be kept down to a minimum and in consequence a considerable amount of work previously considered necessary for the completion of the dual system of rapid transit lines has been postponed.

The Brooklyn Rapid Transit Company is required to refinance about \$60,000,000 of notes falling due on July 1 and the Interborough Rapid Transit Company desires to issue \$40,000,000 of additional bonds already authorized by the Public Service Commission for equipment expenditures under the dual system contract. The city of New York will also need to make an issue of bonds during the year in order to provide for the payment of subway construction.

## Indiana Road May Be Junked

Thomas Flinn, who purchased the property of the Bluffton, Geneva & Celina Traction Company, Bluffton, Ind., at foreclosure last fall, has been authorized by the Indiana Public Service Commission to junk the road after grain in the elevators along the line has been moved to railroad connections. The road was sold at a receiver's sale on Oct. 13, 1917, for \$118,000. Farmers along the road promptly appealed to the commission to prevent Mr. Flinn from abandoning the road. In his answer to the commission Mr. Flinn declared that the Circuit Court ordered the road sold unconditionally after it had been ruled that the company operating it was insolvent; that he bought the property without any conditions, and that the railroad was his to do with as he pleased. For these reasons he asked the Public Service Commission to deny the petition of the people living along the line.

## Interest on Income Bonds Passed

Announcement is made that the New York (N. Y.) Railways has passed the interest on its adjustment income 5 per cent mortgage bonds for the six months ended Dec. 31 last. The company paid no interest on its income bonds during the first six months of 1917. This is the first year since 1912 in which nothing has been disbursed to the income bondholders. In 1916, 5.17 per cent was paid on the issue; in 1915, 3.14 per cent; in 1914, 3.63 per cent; in 1913, 3.88 per cent, and in 1912, 0.77 per cent.

There are \$30,626,977 of these bonds outstanding, the interest upon which is adjusted at the end of each six-month

period, all surplus over and above interest requirements on the company's other outstanding bonds being available for the adjustment 5s. At the time the strike of employees of the New York Railways began a little more than a year ago the company appeared to be in line to pay the full 5 per cent on its adjustment income bonds as its earnings were showing up well in comparison with previous years.

The company has allowed 20 per cent for depreciation and has approximately \$2,000,000 in its depreciation fund, which in the event of the decision of the lower court being overruled by the higher court will be made available for such purposes as may be determined by the management. The income bond holders maintain that they are entitled to the money, whereas the management of the company asserts that it should be utilized for other purposes, or perhaps retained in that particular account to safeguard against the developments of the future.

## Des Moines 1917 Earnings

After paying all expenses, including depreciation, the Des Moines (Iowa) City Railway had a surplus of only \$14,239 as a result of 1917 business. Gross earnings for the year showed a gain over the previous year of \$140,000, but the operating expenses increased about \$180,000. The amount spent for improvements during the year totaled \$803,199.

The annual financial statement of the company for the calendar year 1917 as filed with the City Council is as follows:

Operating revenue .....	\$1,527,121
Operating expenses .....	976,823
Net operating revenue.....	\$550,297
Taxes .....	93,792
Operating income .....	\$456,504
Non-operating income .....	2,898
Gross income .....	\$459,403
Interest charges .....	324,682
Net income .....	\$134,721
Depreciation .....	120,481
Surplus .....	\$14,239

Some of the larger increases in expense for 1917 were as follows:

Wages, conductors and motormen...	\$35,772
Interest .....	47,273
Taxes .....	18,791
Fuel for power .....	29,923
Power plant employees.....	3,453
Carhouse employees .....	6,054
Miscellaneous car-service expense...	5,360

## \$100,000 for Seattle Valuation

H. M. Caldwell, corporation counsel of Seattle, Wash., has advised the City Council that in his judgment \$100,000 is the amount that should be filled into the bill authorizing the employment of experts to make a valuation of the properties of the Puget Sound Traction, Light & Power Company. To date the company has not intimated that it will ask for an order increasing the rate of fare from 5 cents to 6 cents, although the Public Service Commission has given notice that it will consider such an application.



## Financial News Notes

**Reduction in Par Value Put Off.**—The directors of the Cities Service Company, New York, N. Y., have abandoned the plan to issue ten shares of new common stock for each \$100 share outstanding.

**New St. Louis Director.**—F. O. Watts, president of the Third National Bank, St. Louis, Mo., has been elected a director of the United Railways, St. Louis, Mo., to replace John C. Roberts, resigned.

**Additional Bonds to Be Sold.**—The Ohio Public Utilities Commission has authorized the Western Ohio Railway, Lima, Ohio, to sell \$500,000 of its general mortgage 6 per cent gold bonds at 80, the proceeds to be used in making additions, extensions and improvements.

**Toronto Dividend Reduced.**—The directors of the Toronto (Ont.) Railway have declared a quarterly dividend of 1 per cent on the capital stock, payable on April 1. This compares with a previous quarterly rate of 2 per cent, which has been paid regularly since September, 1911.

**Middle West Stock Dividend.**—The directors of the Middle West Utilities Company, Chicago, Ill., have declared the regular quarterly dividend of 50 cents a share on the common and a stock dividend of \$1 a share, both dividends payable on April 1 to stock of record of March 15.

**Notes Extended a Year.**—The Illinois Public Utilities Commission has authorized the Aurora, Elgin & Chicago Railroad, Wheaton, Ill., to extend for one year the \$800,000 of outstanding three-

year 6 per cent notes which matured on March 1. The notes are secured by pledge of \$1,067,000 of Aurora, Elgin & Chicago Railroad first and refunding mortgage 5 per cent bonds due in July, 1946.

**Common Dividend Passed.**—The directors of the Virginia Railway & Power Company, Richmond, Va., have omitted the semi-annual dividend payment on the common stock usually payable in April. The board announced this action necessary in view of "the heavy expenditures required to provide the extraordinary service demanded by war activities, and the large increase in operating expenses due to wage increases and the heavy increases in cost of all supplies that are used by the company."

**\$150,000 Depreciation to Be Used.**—The California Railroad Commission has authorized the United Railroads, San Francisco, to use \$150,000 deposited in its depreciation fund to reimburse its treasury in part for expenditures for additions and betterments to its system from July, 1915, to December last. In a former decision in August, 1915, the commission directed the United Railroads to charge annually because of depreciation, \$550,000, of which \$300,000 might be expended for construction of additional facilities and extensions, and for the purpose of fulfilling franchise obligations, or for the improvement of service as authorized by the commission. The company reports that from July 1, 1915, to Dec. 31, 1917, it has expended for the improvement of its system \$617,742. By former orders, the commission has authorized the company to draw upon its depreciation fund to the extent of \$450,000 for the purpose of paying in part for the improvements.

**Modified Refunding Plan Operative.**—The protective committee representing the depositing certificate holders of the Dry Dock, East Broadway & Battery Railroad, New York, N. Y., has an-

nounced that the modified refunding plan adopted on July 7, 1917, has become binding upon all the depositing certificate holders. On Nov. 28, 1917, the Public Service Commission granted a final order providing for the refunding of the \$1,100,000 of certificates of indebtedness by the issuance of \$650,100 Series C refunding bonds. The protective committee has accordingly instructed the Union Trust Company to surrender all the 5 per cent deposited certificates of indebtedness to the Central Trust Company, New York, as trustee under the refunding mortgage made by the Dry Dock Railroad on Nov. 28, 1917. The new bonds will be registered in the names of the holders of deposit receipts as on the books on Feb. 15, but if desired the bonds may be converted into coupon bonds of the par value of \$100.

**City a Hard Taskmaster.**—Receivership proceedings are reported to have been brought in the district court at Nevada, Mo., by the Light & Development Company, St. Louis, Mo., against the Fort Scott Gas & Electric Company, Fort Scott, Kan., operating 7 miles of electric railway in that city. The local company at Fort Scott is feeling the war-time pinch. It would seem that it considers itself unduly burdened by municipal restrictions. Relief from these might furnish a way out. Conferences looking toward that end have been arranged according to one of the local papers which said recently: "Judge Kelso, chief counsel for the Light & Development Company, who filed the receivership suit, and Mr. Porter, one of the chief operating officers of the company, are in conference with the company's officials and with members of the Chamber of Commerce, to determine whether or not there is a possibility of getting the city off the company's back so as to make it possible for it to continue the operation of the plant without the cost incident to a receivership."

## Electric Railway Monthly Earnings

### BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$83,790	\$45,341	\$38,449	\$19,665	\$18,784
1 " " '16	73,741	41,805	31,936	18,654	13,282
12 " " '17	886,120	502,053	384,067	228,442	155,625
12 " " '16	829,988	460,877	369,111	214,916	154,195

### CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.

1m., Dec., '17	\$132,286	\$131,844	\$442	\$31,164	\$30,722
1 " " '16	110,760	88,869	21,891	30,159	18,268
12 " " '17	1,356,342	1,138,903	217,439	359,785	142,346
12 " " '16	1,235,623	823,444	412,179	356,324	55,855

### CITIES SERVICE COMPANY, NEW YORK, N. Y.

1m., Jan., '18	\$2,031,462	\$30,971	\$2,000,491	\$205	\$2,000,286
1 " " '17	1,854,449	21,729	1,832,720	297	1,832,423
12 " " '18	19,429,505	366,471	19,063,034	2,770	19,060,264
12 " " '17	11,301,249	242,901	11,058,348	216,291	10,842,057

### CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME.

1m., Dec., '17	\$249,608	\$181,090	\$68,518	\$70,201	\$1,683
1 " " '16	245,904	163,667	82,237	66,210	16,027
12 " " '17	3,081,927	2,054,046	1,027,881	820,400	207,481
12 " " '16	2,866,997	1,775,487	1,091,510	809,342	282,168

### COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO

1m., Dec., '17	\$385,269	\$290,974	\$94,295	\$49,535	\$44,760
1 " " '16	336,954	200,513	136,441	43,565	92,876
12 " " '17	4,024,186	2,943,929	1,080,257	558,589	521,668
12 " " '16	3,537,399	2,105,124	1,432,275	516,373	915,902

### COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$1,996,288	\$1,338,117	\$658,171	\$454,220	\$203,951
1 " " '16	1,733,278	972,807	760,471	420,273	340,198
12 " " '17	19,723,736	12,285,005	7,438,731	5,289,106	2,149,625
12 " " '16	16,962,607	9,276,038	7,686,569	5,034,827	2,651,742

### EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

1m., Dec., '17	\$357,987	\$243,634	\$114,353	\$69,883	\$44,470
1 " " '16	296,312	184,854	111,458	63,749	47,709
12 " " '17	3,692,471	2,481,519	1,210,952	785,382	425,570
12 " " '16	3,027,699	1,820,774	1,206,925	755,033	451,892

### GRAND RAPIDS (MICH.) RAILWAY

1m., Dec., '17	\$117,238	\$87,260	\$29,978	\$19,945	\$10,033
1 " " '16	119,184	61,871	57,313	17,740	39,573
12 " " '17	1,303,860	910,176	393,684	218,215	175,469
12 " " '16	1,297,586	828,025	469,561	186,919	282,642

### LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, ME.

1m., Dec., '17	662,331	\$61,625	\$706	\$15,665	\$14,959
1 " " '16	63,270	50,711	12,559	15,401	\$2,842
12 " " '17	898,373	683,684	214,689	186,689	28,000
12 " " '16	803,660	553,296	250,364	187,773	62,591

### NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.

1m., Dec., '17	\$223,117	\$136,403	\$86,714	\$40,137	\$46,577
1 " " '16	216,914	124,162	92,752	42,128	50,624
12 " " '17	2,458,321	1,589,418	868,903	490,071	378,832
12 " " '16	2,383,041	1,453,188	929,853	508,971	420,882

\*Includes taxes.

†Deficit.



# Traffic and Transportation

## Northern Ohio's Case

Company at Akron Presents Statement of Earnings for the Years 1917 and 1916

A. C. Blinn, vice-president and general manager of the Northern Ohio Traction & Light Company, Akron, Ohio, recently made public a statement in which he set forth the conditions under which the company has been operating and the necessity for increasing its revenues. The statement was made in connection with the financial report of the company for the year 1917. The results for 1917 were compared with those for 1916, together with columns showing the increase and decreases in earnings and the percentages. In conclusion Mr. Blinn said:

"From these facts it can be readily seen that the Northern Ohio Traction & Light Company stands little chance of raising the new capital needed for extensions, new equipment and betterments, if its earnings continue to diminish as they must unless its revenues can be increased.

"The cold logic of the situation is that without increased earnings extensions and improvements must be postponed until more favorable conditions develop.

### ANY LET-UP IN WORK A CALAMITY

"I do not believe any thinking citizen wants affairs to take this turn. Personally, I should regard any let-up or improvement to this property as a public calamity. The industrial and commercial growth of the territory demands the largest possible development of the transportation and power services of this company; and anything that would retard the latter would seriously hamper the former. I do not believe the people of this territory want such a condition to arise.

"It can be prevented only by increasing revenues. This can be done in but one way—by permitting a fair and reasonable increase in fares and rates. When the situation is known and understood, I do not believe any reasonable person will object to paying a trifle more for his car ride—as he does for his bread and meat and everything else he eats and everything he wears. The majority of people have accepted philosophically the advanced prices charged for everything they use. They are paying their war taxes in postage and on tobacco, theater tickets and the like without a murmur. They realize that the manufacturer and merchant must have more for their wares or go out of business and they accept the situation without complaint.

"When it is realized that this company is in the same position as the individual and every other business enterprise—that it, too, is paying ad-

vanced prices for everything, I do not believe there will be serious objection to the trifling increase which will enable it to carry on its work of serving the public efficiently and earning a fair and reasonable profit.

### THE PUBLIC'S INTEREST

"The situation is one in which the public has a vital interest—I think an interest as great as that of the company. It should be understood that the company is not a thing apart from the communities it serves. On the other hand it is a vital part of those communities. It has the same interest in the growth and prosperity of these places as all other industries. When the city prospers, the company shares in the general good times. When the city meets with adverse conditions, the company must suffer with it. The interests of city and company are inseparably bound together, and in proportion as they work together both will prosper and grow.

"I have stated the facts frankly and openly because I believe the people are entitled to know just what the conditions are, to the end that, through better understanding and closer co-operation, we may get together and bring about a better service and go forward with the industrial and commercial development of this great section of Ohio."

The company has placed in its city cars in Akron and Canton, on its interurban cars and at its most important agencies a four-page bulletin containing the letters of President Wilson and Secretary McAdoo on public utilities and the report made to Congress by John Skelton Williams, Comptroller of the Currency.

## One Way Out

Portland Committee Thinks Its Tentative Franchise Draft Offers Solution of Fare Problem

A tentative draft of a proposed railway franchise, covering all the present lines of the Portland Railway, Light & Power Company, Portland, Ore., has been prepared by a committee from the Chamber of Commerce and various civic organizations, and presented to Franklin T. Griffith, president of the company, for his consideration. The franchise would relieve the company of all costs of street improvements, bridge tolls, free transportation for firemen and policemen, car license tolls, and provide for a 5-cent fare in the city.

It is pointed out by the committee in support of the franchise that under the grant the company could probably furnish adequate service for 5 cents. G. L. Rauch is chairman of the committee.

## Commission Has Power

Missouri Body Rules It Is Authorized to Hear Appeal for Fare Increase in St. Louis

The Public Service Commission of Missouri, by a vote of three to two, has overruled the contention of the city counselor of St. Louis, Mo., that the commission had no power to hear the application of the United Railways, St. Louis, for an increase in fares because of the fact that the company's franchise constituted a contract between the company and the city and limited fares.

The city counselor sent his brief to the commission in opposition on Feb. 25. In support of his contention Counselor Daues urged three points, as follows:

1. That the State Constitution contains a provision that no law passed by the General Assembly shall be valid unless the local authorities having control of the streets consent to such use.

2. In giving the consent required by this constitutional provision, the city may attach such conditions thereto as it deems necessary and proper.

3. That the ordinance under which the United Railways obtained consent to maintain and operate its system in the streets of St. Louis contains a provision limiting the fare of adults to 5 cents and of children to 2½ cents, and provides for universal transfers.

The brief said that the real question for the commission's decision was the construction that should be put upon the word consent. Mr. Daues held that the word as used in the Constitution has been judicially interpreted by the Supreme Court of Missouri. He quoted six decisions of the Supreme Court in support of his contention that the word "consent" has been construed as bestowing large powers on municipalities.

The United Railways brief, answering the contentions of City Counselor Daues and Mr. Woerner, set out the following:

1. That the constitutional provision cited by Counselor Daues and Mr. Woerner is intended merely as a limitation on the Legislature and is not a grant of power to the city.

2. That the conditions imposed by the city as the price of its consent for the use of the streets are subject to and must necessarily be in consonance with the laws of the State in force at the time of giving such consent or subsequently enacted.

3. That the city, in imposing franchise conditions such as the rate of fare, does not act in a sovereign capacity, or in its own behalf, but merely as the agent of the State, and the conditions it prescribes are therefore subject to modification or abrogation by the State.

In the company's brief attention was called to President Wilson's letter to Secretary of the Treasury McAdoo, on Feb. 22, in which the hope was expressed that to maintain street railways at their maximum efficiency during the war local authorities respond to their relief.

## New Jersey Company Seeks Seven-Cent Fare

Public Service Railway, Operating 840 Miles of Line, Needs More Revenue to Meet Present Unusual Conditions

Seven-cent fares and 2 cents for a transfer, with an additional cent where a second transfer is issued, are requested by the Public Service Railway, Newark, N. J., operating 840 miles of line, in a petition filed on March 5 with the State Board of Public Utility Commissioners at Trenton. The board has fixed March 14 at Trenton as the date for a hearing on the petition. The company has been instructed to furnish copies of the application to all municipalities, 146 in all, affected by the proposed increase.

### SUMMARY OF TEXT OF PETITION

The company set forth its petition in part as follows:

"In the year 1917 the cost of maintaining and operating your petitioner's railway system largely increased and will still further increase in 1918.

"In the year 1917 on account of increased costs of labor and materials the cost of maintenance and renewals of way and structures was \$405,514 more than it would have been at 1916 prices, and that due to the same causes the cost of maintenance and renewals of equipment of 1917 was \$183,657 more than the same would have been at 1916 prices.

"In the year 1917 the cost of power was \$658,339 more than the same power would have cost at 1916 prices.

"In the year 1917 the cost of conducting transportation, excluding the cost of power, was \$235,231 more than the same would have been at 1916 costs.

"In the year 1917 the taxes levied against your petitioner were \$279,142 more than those levied in 1916.

### EXCESS COSTS \$1,761,885

"The sum of the excess costs in 1917 over 1916, as set forth above, is \$1,761,885.

"Notwithstanding the increased costs of labor and materials in the year 1917 over the costs of the same labor and materials in the year 1916, these costs have now very largely increased over the average 1917 costs, and will continue to increase during the year 1918.

"At the present costs of labor and materials the cost of maintenance and renewals of ways and structures in 1918 on the basis of work done in 1917 will be \$505,981 more than the cost of such maintenance and renewals in 1917, and the cost of maintenance and renewals of equipment in 1918 at present costs for labor and materials on the basis of work done in 1917 will be \$411,638 more than the cost of such maintenance and renewals in the year 1917.

"The cost of conducting transportation in 1918 at present costs on the basis of business done in 1917 will be \$621,236 more than the cost of the same in 1917.

"The sum of these increased costs for the year 1918 at present prices, on

the basis of the 1917 business, over what the same would have cost at 1917 prices as set forth above is \$1,538,856.

"The sum of these excess costs for the year 1917 over the year 1916 and of these excess costs for the year 1918 over the year 1917, all as shown above, is \$3,300,741.

"The cost of rails is now 94.6 per cent higher than the average cost of rails in the year 1916.

### OTHER COSTS

"The cost of track special work is now 109.5 per cent higher than the average cost of such special work in the year 1916.

"The cost of track labor is now 61.7 per cent higher than the average cost of such labor in the year 1916.

"The cost of car bodies is now 52.2 per cent higher than the average cost of car bodies in the year 1916.

"The cost of electric equipment of cars is now 66.7 per cent higher than the average cost of such equipment in the year 1916.

"The cost of all other materials and labor required by your petitioner, in the conduct of its business, has increased a large percentage over the average cost of such materials and labor in 1916.

"Your petitioner made capital expenditures for extensions and improvements in 1916 and 1917 of \$4,444,894, 8 per cent on which is \$355,591, and now needs large sums of money to maintain and improve its railway system in order to enable your petitioner to meet the present demands for service and to provide for the growing demands for service required by the government and by the public, and your petitioner, without the relief hereby asked for, will be unable to obtain the new capital necessary for such additional construction, equipment and extensions.

"In the year 1917 your petitioner carried 461,354,364 revenue and transfer passengers, of which number 22.15 per cent, or 102,201,402, were transfer passengers.

### WHAT THE COMPANY ASKS

"A charge of 7 cents in the rate of fare where 5 cents is now charged, a charge of 2 cents for the first transfer, and additional charge of 1 cent for a transfer issued on a transfer, would increase the annual revenue of your petitioner \$3,700,000.

"The present rates of fare charged by your petitioner are unjust, unreasonable and insufficient to allow your petitioner to furnish reasonable and adequate service, and maintain the integrity of the physical property, and that the increased rates of fare as stated previously are just and reasonable.

"Your petitioner therefore prays that your honorable body approve and by order fix 7 cents as the rate to be

charged by your petitioner where 5 cents is now charged, and in addition thereto a charge of 2 cents for each transfer issued on a cash fare and an additional charge of 1 cent for a transfer issued on a transfer, and that your petitioner may have such other and further relief as may seem reasonable and proper."

### PRESIDENT MCCARTER'S STATEMENT

Thomas N. McCarter, president of the company, issued a statement as follows:

"In making an application to the State Utility Board for more revenue Public Service Railway is attempting to meet a most unusual situation which confronts it as the result of economic conditions arising out of the war. Abnormal demands have been and are being made upon the railway to provide transportation facilities for shipyards, munition plants and other industries that are directly engaged in war work and at the same time every element of cost that enters into the electric railway business has been going up to hitherto unheard-of levels.

"If the company is to meet the demands made upon it, if it is to provide cars for the thousands of extra war workers and if it is to keep its track and equipment in proper operating condition, it must have more revenue. The 5-cent fare does not cover the cost of electric railway transportation under existing conditions. It is obvious that such a state of affairs cannot go on indefinitely and the public must face the fact that it cannot continue to get its railway service for less than cost. In making up the revised rates of fare we have sought to secure only such additional revenue as will enable the company to provide adequate service and meet the abnormal costs of labor and material which the war has produced in our business as well as in all other businesses."

### City Marks Time

The City Council of Seattle, Wash., recently determined to take no action with respect to a possible increase of fares in Seattle until the Puget Sound Traction, Light & Power Company petitions the State Public Service Commission for such an order. The decision was made by the Council when a bill introduced by Corporation Counsel Hugh M. Caldwell was taken up. This measure provided for an appropriation of \$100,000 to employ experts to make a valuation of the company's property. Mr. Caldwell did not expect that this entire amount would be expended, but set the sum as a maximum expenditure. The judiciary committee was, however, directed to prepare a bill authorizing the corporation counsel to assist in the presentation of Tacoma's defense against complaints filed with the Public Service Commission against the company, charging inadequate service in that city. The corporation counsel warned the city that if the Public Service Commission assumed jurisdiction in the Tacoma case, and the case was dis-

posed of at an early date, a construction of the law might be obtained adverse to municipalities without the city of Seattle having an opportunity to participate in the litigation until after the law has been settled.

## Maine Fare Hearing

**Portland Case Adjourned by Utilities Commission for Several Weeks—Proposed Tariff Suspended**

The Public Utilities Commission of Maine on Feb. 25 opened the hearing on the application of the Cumberland County Power & Light Company, Portland, for increased fares on the lines of the Portland Railroad, operated under lease. The application is for a 6-cent fare in the central zone, covering the thickly populated sections of Portland and South Portland, and 2 cents on the mile zones on the interurban lines. The company consumed the day on the valuation made by George E. Haggas.

The valuation report as presented by Mr. Haggas included the following figures:

Cost of reproduction (new) as of Dec. 31, 1917, the basis upon which the rate of return should be established .....	\$8,614,361
Cost of reproduction (new) less depreciation .....	7,518,458
Mr. Haggas estimated that the proper annual reserve for depreciation was .....	134,500
From his traffic survey he said he expected the proposed raise in rates to yield an increased gross revenue annually of .....	205,600

In his testimony A. H. Ford, vice-president and general manager of the company, said that the increased revenue was needed for expected increases in operating expenses for labor, materials, taxes, power and to provide a margin of safety on the fixed charges.

Before adjourning the meeting on Feb. 27 to meet again after two or three weeks the commission announced that the proposed increase in fares, which was to become effective on March 11, would be postponed for a period not exceeding three months.

## Another I. T. S. Hearing March 20

At the hearing of the objectors to the blanket petition of the Illinois Traction System for increased rates before the Illinois commission on March 5 and 6 witnesses for the company who appeared on Feb. 19 were cross-examined, and further testimony was presented following the objecting citizens. Champaign, Urbana, Danville, Bloomington, Granite City, Ottawa, Cairo, Galesburg and the Clinton Council approved the proposed rates and did not object. Jacksonville and Quincy waived cross-examination. The commission took all the motions under advisement and set March 20 for oral argument. By agreement the case of the Peoria Railway was postponed for sixty days. That city has retained Prof. E. W. Bemis to assist in opposing the straight 5-cent fare. The commission accepts the blanket petition as an emergency matter, and if the increase is granted it will retain jurisdiction.

## Portland Six-Cent Fare in Court

**Oregon Commission Regards Its Existence Threatened in Suit Brought by the City Against That Body**

Arguments in the case of the city of Portland versus the Portland Railway, Light & Power Company, in the matter of the 6-cent fare authorized by the Oregon Public Service Commission on Jan. 10, were begun in Circuit Court at Portland on Feb. 26. The city's case is presented by City Attorney La Roche, Martin L. Pipes and Wilson T. Hume. The Public Service Commission is represented by Attorney-General Brown and Deputy Attorney Bailey. The company is represented by Attorneys Harrison Allen, Frederick V. Holman, R. A. Leiter and W. C. Benbow.

### EXISTENCE OF COMMISSION THREATENED

Assistant Attorney-General Bailey, representing the Public Service Commission, in his speech on the opening day of the hearing, stated that the very existence of the commission was threatened in the court action now in progress, and that the commission will have lost its usefulness should the Courts decree that it has not the power to fix rates. Mr. Bailey reviewed the entire 6-cent fare controversy. He declared that the justice or injustice of the 6-cent fare was not at this time an issue before the court. He said:

"The only thing we have to consider in this case is whether or not the Public Service Commission had the jurisdiction to change these rates. It is the sole question here involved."

One of the points brought out by Attorney Bailey was the fact that a municipality at all times is only an agent of the State, and that any franchise or rate which is fixed by a municipality must be given or fixed with the understanding both by the city and by the public utility to whom the franchise is given that the State can at any time it sees fit step in and make different rules, rates and regulations. Attention was also called to the fact that Federal Judge Bean, in a case affecting the Portland Railway, Light & Power Company, where the City Council passed an ordinance compelling the railway to sell six tickets for 25 cents, granted the company a permanent injunction, holding that rate-fixing was vested in the Public Service Commission only.

### PREVIOUS CASE AS PRECEDENT

Frequent reference was also made to the Woodburn case, wherein the Supreme Court held that the Public Service Commission has the power to fix telephone rates, over the objections of the city of Woodburn. Attorney Bailey pointed out that the briefs to be filed in the present case will be almost identical in character to those filed in the Woodburn case.

Mr. Bailey's argument was based largely on the theory that the city of Portland is attacking the constitutionality of the act creating the Public Service Commission.

It is stated that the city will not

contend that the act is unconstitutional, but that the action of the commission in ordering the increase was a legislative act upon the part of its members, and therefore comes under the provisions of the laws of the State regarding the initiative and referendum. It is expected that this will develop as the strongest feature of the city's case, and it is stated by Commissioner Kellaheer and City Attorney La Roche that a referendum vote on the 6-cent fare is possible.

It is expected that the city authorities will contend that the members of the State Commission were in session on legislative business when they directed the increase in fares, and that, therefore, under the law, a referendum may be filed by the people of Portland within ninety days time from the date such order was enacted.

## Fares in Ogdensburg

**Railway in That City Seeking Increase Has Paid No Return on Stock Since 1902**

The Ogdensburg (N. Y.) Street Railway recently presented its argument to the Public Service Commission of the Second District, under a petition which it has filed for authorization to increase its fares. There was no appearance by the city in opposition, and Judge Irvine, who presided, announced at the close of the hearing that he would correspond with the Ogdensburg officials and ascertain their views.

### SOURCE OF POSSIBLE DISCRIMINATION

State Hospital Commissioner Morgan asked that employees of the Ogdensburg hospital be afforded the same reduction privilege in the purchase of tickets as allowed mill employees, but N. F. Towner, representing the railroad, objected on the ground that the hospital was located at a distance from the city, that the haul was much longer and that there was a large added cost in operating in the winter months. Mr. Morgan said the hospital acted under an agreement with the railroad. He said he did not desire any preferences for the State employees over that accorded others. This discussion raised the question of whether there is a right to allow one person to ride on a ticket which cost him 3 cents and another person on a 5-cent ticket.

Paul B. Murphy, secretary and treasurer of the company, presented figures covering operation of the road for ten years. It developed that until in recent years the railroad has not been compelled to pay for power. No dividends were paid from April 1, 1902, to Dec. 31, 1917. It was shown that operating charges and tax valuations had increased and that contemplated street improvements would add to the company's expenses.

## Zone Fares Best for Rhode Island

### Special Legislative Commission Orders Adoption of System With Five-Cent Central Areas—Recommends Taxation and Franchise Reforms

An increase in fares through the adoption of a modified zone system, the abolition of municipal franchises, the elimination of paving obligations and a substantial reduction of taxes, are among the methods of relief recommended on March 7 by the special commission on Rhode Island Company affairs. This commission was appointed by the General Assembly early in 1917 to investigate the company's condition.

In accordance with the law creating the commission, that body has certified its findings to the Public Utilities Commission, and has ordered that the new rates of fare and the new transfer privileges be put into full force prior to April 1, 1918. The remainder of the commission's report is in the nature of recommendations made to the State Assembly.

#### ZONE SYSTEM IS FAVORED

The special commission declares that the flat 6-cent fare is inequitable and unjust, and it recommends and orders established a modified zone system with 5-cent central areas. In Providence the existing 5-cent fare limits are also adopted as new 7-cent fare limits, thus making a uniform increase for all persons in the area between the old and the new 5-cent zone limits.

Between the various central zones there will be intermediate 2-cent zones, and in general, it is said, the rate will be less than 2 cents a mile. To fit existing conditions, the length of zone varies somewhat, according to village or town lines.

The increase in fare between Providence and Woonsocket is 6 cents, from 20 to 26 cents. The fare between Providence and Pawtucket is increased to 7 cents, but the patron will hereafter be allowed to have a transfer at either end of the ride, a privilege now denied.

#### VALUE OF PROPERTY

The special commission finds that the true value of the company's property is \$29,000,000, and that it is entitled to a 6 per cent return on that sum, which would amount to \$1,740,000. It is also found that the company is now rendering service that compares favorably with service in other cities.

The commission has determined that the actual cash invested in the company is \$28,802,590. It reports that the Narragansett Pier division, being a steam road, has no logical position as a branch of the Rhode Island Company, and, therefore, does not figure in the valuation of the company.

#### OTHER REMEDIES RECOMMENDED

The subject of taxation is discussed at considerable length in the report, and it is shown that the Rhode Island Company pays more than \$500,000 a year in the form of taxes. This sum, the commission finds, is "extremely excessive."

The company, the report shows, is under the jurisdiction of forty-two different authorities.

It is recommended that all municipal franchises be repealed and that all franchise taxes be cancelled. Local control should also be abolished, the report finds, and the Public Utilities Commission should have original and full jurisdiction over the company. The special commission recommends that the paving obligation be abolished, as it now stands, and the company pay only for what it destroys.

## Fare Request Refused

### Council of Columbus, Ohio, Rejects Appeal for Advance from Eight to Six Tickets for a Quarter

The City Council of Columbus, Ohio, on Feb. 26, refused the request of the Columbus Railway, Power & Light Company for an increase of fare from eight tickets for 25 cents to six tickets for 25 cents. This refusal was based on the following reasons:

1. It would be considered unlawful.
2. The request is unjust and unwarranted.
3. Present fares are thought adequate with efficient management.

Councilman Weinland argued that the company has no more right to ask for an increase in the rate of fare than he would to ask for a reduction of the rate of interest on a real estate loan.

Councilman Zimpfer asserted that it is not more revenue the company needs, but more efficiency in management.

Councilman Alcott based his objection on Section 3771 of the General Code which, he said, provides that "The municipality shall not, during the term of such grant or renewal, release the grantee from any obligation or liability by the terms of such grant or renewal of grant."

#### INVESTIGATING COMMITTEE PROPOSED

At the suggestion of City Attorney Scarlett, a committee will be appointed to employ a railway expert to make a survey of the company's property and books and ascertain the facts in the case.

The company has begun a series of advertisements in the local newspapers to acquaint the public with the necessity for an increase in the rate of fare.

#### PRESENT BURDEN TOO GREAT

The company says that the unusually low rate of fare was made in the interest of the public, and the terms of the franchise might have been carried out successfully under normal conditions, but now that revolutionary changes have come about, the company finds the present burden beyond its power to bear.

Attention is also called to a mistake people have been making in interpret-

ing the terms of the contract. The franchise provided for a reduction in the rate of fare when the gross receipts reached \$1,750,000. The gross receipts exceeded this amount in 1912 and the ticket fare was reduced to eight tickets for 25 cents. Gross receipts and profits have accordingly become confused in the minds of many, with the result that the impression prevails that the company is already making money and still wants to increase its fares.

Another advertisement appeals to the women of the city. Women use the cars more than do men. It is believed they will see the analogy between the greatly increased prices of other commodities and the requested increase in the rate of fare. They understand the fact that an income or allowance, fixed several years ago, will not cover the necessities of the household at present, and there is a similarity between this and the income of the company which was likewise fixed when there was no thought of the prices asked now for materials and the necessary demands of labor.

## Wants Fare Case Dismissed

### City of New York, Through Assistant Corporation Counsel, Wants Third Avenue Railway Appeal Denied

The Public Service Commission for the First District of New York was asked on Feb. 28 to dismiss or postpone the hearings on the application of the Third Avenue Railway for permission to charge 2 cents for transfers as a means of financial relief. The motion in question was made by John P. O'Brien, assistant corporation counsel representing the city of New York.

#### NORTH SHORE DECISION QUOTED

He based his motion on a recent decision of the commission in the New York & North Shore Traction Company case, in which the commission held that it had no power to grant the company the desired increase, because the franchise fixed the maximum fare at 5 cents. This decision was abstracted in the *ELECTRIC RAILWAY JOURNAL* of Jan. 19, page 125.

Mr. O'Brien contended that in some of the franchises granted to the Third Avenue Railway and its subsidiaries, provisions were made for a maximum 5-cent fare. He further contended that the proposal to charge 2 cents for transfers was tantamount to a proposal to increase the fare, and hence the case stood in exactly the same position as that of the North Shore company, namely, that the commission had no power to act. Mr. O'Brien's motion was denied, with the right to renew it on a future occasion should it develop that his contention was sound.

The hearing on Feb. 28 was largely taken up with the preliminary examination of Charles E. Schuyler, a real estate appraiser, who had made an inspection of the company's land and buildings. The hearings have been adjourned until March 11.



## Low Fare Tickets Stand

**New Jersey Court of Appeals Holds Company Must Sell Six-for-a-Quarter Tickets**

The New Jersey Court of Errors and Appeals handed down a decision on March 4 sustaining the Supreme Court of New Jersey and the Board of Public Utility Commissioners of New Jersey in the fight by the people of Trenton to prevent the Trenton & Mercer County Traction Corporation from abolishing the six-for-a-quarter tickets in Trenton. If the case is carried up it must now go to the United States Supreme Court. The same question is now hanging fire in the United States District Court. Justice Swayze of the New Jersey Supreme Court says that the Board of Public Utility Commissioners had jurisdiction in the case after the company claimed the State board was without jurisdiction. The Supreme Court says in part:

"We think there was a valid contract requiring the company to sell six tickets for a quarter, and hence the Board of Public Utility Commissioners might well conclude that such a rate was just and reasonable under the circumstances of the case."

## Brooklyn Service Order

**B. R. T. Required to Carry Time-table Data in Each Car on its Surface Lines**

The Public Service Commission for the First District of New York announced on March 5 the adoption of an order directing the Brooklyn Rapid Transit Company to place in each surface car a sign bearing the run number of the car and the schedule on which it is being operated, together with the time-table for the line operating the car. The order was presented by the committee on complaints, consisting of Commissioners Charles S. Hervey and F. J. H. Kracke, as the result of an investigation extending over several weeks into complaints against the company.

The order affects the operating units of the Brooklyn Rapid Transit System, and covers all surface lines in the Borough of Brooklyn.

Failure of the companies to operate their cars according to the schedules on file and within the prescribed limits of the new regulation will constitute a violation of the order and will be subject to the penalties imposed by the public service law.

Commissioners Hervey and Kracke made public a memorandum, submitted by them to the commission in connection with the new order, in which they said:

"Almost immediately upon taking up its work the committee on complaints became convinced that, because the operating schedules of surface railroad lines generally were not under formal commission order, satisfactory control was practically impossible. The committee now feels that the maintenance of regular and adequate service on

street surface lines can be enforced only if the companies are required to file definite schedules and if non-compliance with those schedules is made a violation of an order of the commission."

## Passenger May Elect

**Where Two Rates Exist Between Points the Passenger May Decide Under Which He Will Travel**

The Public Service Commission of Indiana on Feb. 22 held "that where a railroad publishes and files two passenger rates between two points on its lines, one a through rate, the other a combination of two intermediate rates, the passenger may elect as to which rate he will contract for passage under."

The case concerned was one brought by the Carmel Commercial Club against the Union Traction Company of Indiana. The company has a regular rate of 30 cents between Indianapolis and Carmel and vice versa. Also it has a rate of 19 cents between Carmel and Forty-sixth Street, Indianapolis, and 5 cents between Forty-sixth Street and the Traction Terminal Station and vice versa. Under the combination of fares the rate is only 24 cents.

Some time ago a number of Carmel business men got on an interurban car at Carmel, proposing to pay the two rates of 19 and 5 cents. The conductor contended that he must charge them 30 cents and the case was carried to the

## A Weekly Railwayman

**Kansas City Railways Carries Its Case Direct to the Public in a Paper Distributed on the Cars**

The Kansas City (Mo.) Railways, assisted by a member of the Public Service Commission of the State, by weather conditions and advertising, was able by the second week of February to restore the schedules that had been maintained last July. The active co-operation of the commission was extended through a member who at the request of the company was appointed to spend some time in Kansas City to observe the operation and problems of the railway.

The company had for several months been advertising extensively over the territory for men. While there has been a comparatively satisfactory response to the advertising, an insufficient number of applicants has proved to be qualified either in preliminary examination or in trial. The company was willing to go to the limit in securing additional men, and on Jan. 21 increased the rate of pay for men while in training from 50 cents to \$1.50 a day. The company also reduced the requirements of deposits by new men from about \$12 to \$5. Warmer weather late in January made it more comfortable for men to get out in the morning and schedules became fairly well restored.

On Feb. 4 the company began to

# THE RAILWAYMAN

Published Weekly by the Kansas City Railways Company.

Vol. I KANSAS CITY, MO., FEBRUARY 4, 1918. No. 1

### Just a Word About Service and Some of the Conditions Now Existing Here and Elsewhere

Every street car patron knows the service during the last few months has not been up to standard. Of course, the Company has been blamed. An insufficient number of cars have been in operation and cars have been "hunched," running in "flocks," as one newspaper put it the other day, until the public has become tired of it.

No wonder you grew tired of it! We grew tired of it ourselves.

And that brings us to some of the reasons that have existed, and still do exist, to cause imperfect street railway service in Kansas City. To quote a motorman: "It took me 19 minutes last night to get from Eight and Grand to Fifteenth and Grand, and I was getting my car over the track just as fast as I could." The reason? "Blocked by traffic." It happens every

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*This publication is the first of its kind we have issued. Please read it, and offer any criticism or suggestion you may desire. It will be placed in the boxes on the cars each Monday morning hereafter. The Company takes this method of defending itself against any attacks that are manifestly unfair. In this we ask the Public's assistance.*

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day. Wagons will get on the track in front of cars and stick there; autos will dash in front of cars in crossing tracks, while drivers of dray wagons apparently cannot get over the idea that the street car tracks were made for their especial benefit. Every time one gets on the track the street car is laid out for a minute or two. When this happens you will find a lengthened space between cars, and two or more cars in a bunch.

Here's another condition that exists in the downtown section. Have you ever gone along the streets and seen automobiles and wagons parked so closely to the curbing that you couldn't get a street car past unless you moved the car tracks? Of course you have. It is a common occurrence. The car crew must then secure the services of a policeman, lift the automobile or wagon so the car will clear or hunt up

FIRST PAGE OF FIRST ISSUE OF NEW WEEKLY

commission. In its decision the commission held that the point involved was one of law and found what it believed to be a parallel in an Appellate Court case and its order was based on this ruling.

issue once a week a leaflet for distribution in the cars to the public. It is called *The Railwayman*. The company said that it took "this method of defending itself against any attacks that are manifestly unfair."



## Transportation News Notes

**Fare Increase Sought in Memphis.**—The Memphis (Tenn.) Street Railway has petitioned the Board of City Commissioners for an increase in fare from 5 cents to 6 cents.

**May Ask Fare Advance.**—There is a possibility that the Des Moines (Iowa) City Railway will ask for a rate increase at the spring city election on March 25, but no formal notice has yet been served to this effect.

**New Paper at Los Angeles.**—The Los Angeles (Cal.) Railway has begun the publication of *A-Z-U-R-I-D-E*, described by the company as "facts about street car service and thoughts by the trolley philosopher." The publication is 3½ in. wide by 6¼ in. high and contains four pages.

**Skip Stop Used in Fort Wayne.**—The Fort Wayne & Northern Indiana Traction Company has begun to use skip stops on the city lines of Fort Wayne, Ind. More than 40 per cent of the stops in the residence district will be eliminated. No stops will be eliminated in the business district.

**Five-Cent Fare for Fort Wayne.**—The Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., on March 4 was granted permission by the Public Service Commission of Indiana to charge a straight 5-cent fare and eliminate reduced rate tickets during the period of the war.

**Freight Bill Signed.**—Governor Edge of New Jersey has signed the bill passed by the last Legislature which permits electric railways to carry freight and express under rules to be fixed by the Board of Public Utility Commissioners. The Newark *Ledger* regards legal authority for the use of trolley cars for freight and passenger service as "a step in the right direction."

**New B. R. T. Talks.**—The Brooklyn (N. Y.) Rapid Transit Company began the publication of a new series of transit talks on March 5. The first one was headed "Other People's Troubles—and Ours." The company closed its appeal as follows: "If you will read these publications as they appear from time to time you will appreciate more keenly some of our difficulties, and, perhaps, to the extent of your ability, you will help us alleviate or remove them."

**1,300,000 Passengers a Day.**—Figures given out by the Public Service Railway, Newark, N. J., show that an average of 1,300,000 passengers were carried every day last year over its lines. The total for the twelve months was 476,974,983, a gain of about 25,000,000 over the previous year. The company

operates in 146 municipalities. About three out of every ten revenue passengers use transfers. The passengers carried on transfers figure in the total of 476,974,983.

**Publicity for Staggered Hours.**—The Philadelphia *Public Ledger* in its business section for Wednesday, Feb. 27, contained a dispatch from Cleveland under date of Feb. 26, in which it played up the plan of Fielder Sanders, City Street Railway Commissioner of Cleveland, to reduce the rush-hour peak by having stores, factories and other establishments stagger their times for opening and closing. Mr. Sanders' proposal was reviewed recently in the *ELECTRIC RAILWAY JOURNAL*.

**Women Conductors Must Stand.**—All employees of the Brooklyn (N. Y.) Rapid Transit Company in uniform riding on the cars of the company as passengers must stand when there are other passengers unseated in the cars. The question was raised in connection with women conductors. The company has recently restated its rule on this point as follows: "An employee in uniform always should defer to a passenger of either sex. An employee is to stand when there are other passengers unseated in the car."

**Service Hearing Dates Set.**—The Public Service Commission of the State of Washington has set March 11 as the date for hearing of the Seattle service complaints against the Puget Sound Traction, Light & Power Company and definitely set March 14 for the hearing in Tacoma. If the above dates are agreed upon, the Seattle case will be given priority as to hearing and probably as to decision, unless both rulings are rendered jointly. The question of a possible increase in fare in Seattle is more directly involved than complaints of service.

**Seattle Authorizes One-Man Cars.**—The joint committees on franchise and judiciary of the City Council of Seattle, Wash., recently voted unanimously to recommend that the Council pass an ordinance permitting the operation of one-man cars by the Puget Sound Traction, Light & Power Company over such of the routes named in the petition of the company as the Board of Public Works deems practicable. A. L. Kempster, manager of the company, advised the committee that the twenty-five one-man cars which had been received would be used merely to supplement the present service, and none of the larger cars will be displaced.

**Accident Fund Dividend Distribution.**—Payment of the 1917 annual safety-first dividend to its platform men was recently made by the San Diego (Cal.) Electric Railway. For several years it has been the policy of the company to set aside a fixed percentage of the gross earnings for the payment of accident claims and to divide any balance left in the fund among the men, in accordance with the number of hours each man has been on duty during the year. Last year the total saving was \$12,225 and the total hours of

service of all men was 642,761. The dividend was 1.902058 cents per man per hour. If a man worked 1000 hours during the year his dividend was \$19.02. About 270 men participated in the dividend distribution.

**Fare Increase Request Renewed.**—The Northampton, Easton & Washington Traction Company, Easton, Pa., is making another effort to increase its rates from 5 cents to 6 cents in each of its seven zones between Phillipsburg and Port Murray. The increase was asked some time ago and was opposed by Franklin Township, which pointed out a clause in the franchise of the company prescribing that only 5 cents should be charged in that township. The commission refused the request on that ground. The Supreme Court, however, in a recent decision held that such franchise contracts cannot obtain to the detriment of companies.

**Trenton Differences Up to Commission to Decide.**—The City Commission of Trenton, N. J., has turned down the proposal of the Trenton Chamber of Commerce to have a board of arbitration appointed to adjust the differences between the citizens and the Trenton & Mercer County Traction Corporation. The City Commission, through City Solicitor Charles E. Bird, says that matters must be adjusted by the Board of Public Utility Commissioners. The Mercer County Central Labor Union has asked the City Commission to call a mass meeting so that the entire community may have an opportunity to express an opinion as to whether the city of Trenton should purchase the property of the Trenton & Mercer County Traction Corporation. The labor unions propose to form a municipal ownership league to work to that end.

**Binghamton Tariff Suspended.**—The Public Service Commission of the Second District of New York on Feb. 21 ordered the Binghamton Railway to suspend until April 30 the proposed discontinuance of the sale of certain reduced-rate tickets and ordered the railway to publish and file a proper tariff amendment containing notice of the suspension. More than 400 employees of the International Time Recording Company at Endicott, 8 miles from Binghamton, on Feb. 16 filed with the commission a protest against the proposed discontinuance of a twelve-ride ticket book, good between Binghamton and Endicott and sold for \$1, making each ride 8 1/3 cents. The regular round-trip fare is 25 cents. Protest was also filed against discontinuing a twelve-ride book between Johnson City and Endicott, which sold for 60 cents when the regular round-trip fare is 15 cents. The company planned to discontinue the sale of tickets on Feb. 25. The railway has been served with the complaint and the commission will investigate the reasonableness of the proposed action of the railway. On March 4 the railway filed its answer to the complaint. It is expected that a hearing will soon be held.

# Personal Mention

## F. W. Coen Elected

Vice-President and General Manager of  
Lake Shore Made President  
of C. E. R. A.

F. W. Coen, vice-president, general manager and purchasing agent of the Lake Shore Electric Railway and affiliated properties, was elected president of the Central Electric Railway Association at the meeting in Dayton, on March 1. Mr. Coen has been connected with the Lake Shore Electric and its predecessors for twenty-five years. When in 1893 he took a clerical position with the Sandusky, Milan & Norwalk Electric Railway he had been employed in a bank in Vermillion for some time. At this time the railway mentioned had been in operation only a week. There were then about 18 miles of line, which made it one of the longest electric interurban roads in the world at the time. The interurban line was gradually combined with

closely related to railway operation. He was secretary of the Ohio Interurban Railway Association for several years and promptly transferred his interest to the Central Electric Railway Association when it was formed. He has served successively as second and first vice-president of this association, and also as a member of its executive committee. He was a member of the original committee appointed by the American Electric Railway Association to formulate plans for co-operation with the federal government. As manager of a road which was a pioneer in through, high-speed passenger service Mr. Coen has made a special study of heavy traction matters. He has been very successful also in developing cordial relations between political bodies and the Lake Shore Electric Railway and in fostering a spirit of loyalty to the company among its employees. His election to the presidency of the association was, therefore, a logical development, particularly as he has had practical experience in personally working in nearly every department of the electric railway.



F. W. COEN

local city properties, leading eventually to the formation of the Lake Shore Electric Railway in 1901. Of this system Mr. Coen was made secretary. In the meantime, however, in 1895, he had been assistant secretary of the Lorain & Cleveland Railway. After the formation of the Lake Shore Electric Railway Mr. Coen was successively promoted to be secretary and treasurer in 1906; general manager, continuing as treasurer only, in 1907, and vice-president and general manager in 1908. The last-named position he has occupied ever since. In his present position Mr. Coen is in active charge, with the same title, of the Lorain Street Railroad, the Sandusky, Fremont & Southern Railway, the People's Light & Power Company and the Bellevue Illuminating & Power Company. He is also a director of the Fostoria & Fremont Railway. Along with his administrative work Mr. Coen has identified himself with a number of activities

W. T. Bailey, formerly roadmaster of the Peninsula Railway, San Jose, Cal., is now on that company's pension list.

E. P. Haquette, formerly purchasing agent of the Oakland, Antioch & Eastern Railway, Oakland, Cal., has become connected with the sales division of the Pratt & Whitney Company, San Francisco, Cal., tool makers.

H. A. Clarke, general manager of the Central New York Southern Railroad and Ithaca Traction Corporation, Ithaca, N. Y., has secured a leave of absence in order to do some special engineering work in connection with applications of several electric railway properties for increased fares that are now pending before the Public Service Commission of New York and other states.

Arthur Gaboury, superintendent of the Montreal (Que.) Tramways, has received from the French government the title of Officer of the Academy, as a recognition of his signal services for the advancement of French activities. Knowing of Mr. Gaboury's unselfish and hearty interest in many matters outside of his profession, this distinction is regarded by his friends as well deserved.

E. C. Faber, formerly traffic manager of the Traffic Bureau of the Electric Railway War Board of the American Electric Railway Association, has been appointed manager of the War Board, a new position created as part of the reorganization following the resignation of C. Loomis Allen as director. An illustrated biographical sketch of Mr. Faber appeared in the issue of the

ELECTRIC RAILWAY JOURNAL for Feb. 2, 1918, page 256.

E. J. Smith has been appointed auditor of the Kentucky Public Service Company, Bowling Green, Ky., succeeding G. D. Warden, who has enlisted in the National Army. Mr. Smith was formerly assistant secretary and assistant treasurer of the Cayuga Cement Corporation, Portland Point, N. Y. Both companies are operated by The J. G. White Management Corporation, New York, N. Y. Mr. Smith for a number of years was connected with the accounting department of the Lehigh Valley Railroad at Sayre, Pa., previous to which time he served in the auditing department of the Ithaca (N. Y.) Traction Company.

Julien H. Harvey, superintendent of efficiency of the Kansas City (Mo.) Railways, has resigned to accept the management of a public safety campaign being started by the Rochester (N. Y.) Chamber of Commerce and the local Safety Council. The campaign will last from March 1 to Sept. 1. It will be conducted with the co-operation of the National Safety Council. It is planned to make the Rochester campaign the most comprehensive effort at public safety work that has been under-



J. H. HARVEY

taken by any community, and it is likely that it will provide an example for safety work throughout the United States. Mr. Harvey has been with the Kansas City Railways for fifteen years. He started as timekeeper and advanced through the positions of chief timekeeper, secretary to the president, superintendent of employment, division superintendent and superintendent of efficiency. He had held the last-named office for two years, and during that time organized and established the company's safety work, its power-saving system, its welfare building and loans, and similar enterprises in behalf of the employees, made general studies and established programs for the promotion of efficiency in operating, maintenance and administrative departments of the company, all of which work is now going forward in the hands of superintendents in such departments. Mr. Harvey was one of the organizers of the local Safety Council in Kansas

City two years ago and served two terms as president. He declined re-election as president of the local council because of duties connected with work of the National Safety Council. He has served one year as secretary of the electric railway division of the National Safety Council, and last fall was elected chairman of this section. Mr. Harvey was also elected to the executive committee at the national convention of the council. He had been named as chairman of the Public Safety Committee of the Kansas City Local Council and had been appointed chairman of this branch of work of the Kansas City Chamber of Commerce. The Rochester work, on account of its very wide scope and national importance, demanded a man of Mr. Harvey's special experience and equipment.

## Obituary

George F. Hargis, general manager of the Los Angeles & Mount Washington Railway, Los Angeles, Cal., is dead as a result of injuries received when he was struck by an electric railway car in that city recently. Mr. Hargis was one of the organizers of the railway of which he was the manager. He was well known in financial circles in Los Angeles.

H. Clark Prather, who recently left the service of the Peter Smith Heater Company to accept a commission as first lieutenant in the Ordnance Department, died at Davenport, Ia., on Feb. 21. Although Mr. Prather was still in his thirties, he had made a notable mark as an electric railway operator. Beginning as a lineman on the Union Traction Company of Indiana in the late nineties, he worked his way through the various mechanical departments on different properties until he became shop foreman successively on the Brooklyn Rapid Transit System and the Public Service Railway. On leaving the latter company he became superintendent of the Roanoke Railway & Electric Company and then entered the car equipment business as a member of the firm of I. R. Nelson & Company. He was soon called, however, by the Buffalo, Lockport & Rochester Railway as master mechanic where, after several years' service, he became general manager in October, 1913. In 1914 he was appointed manager of the Rochester-Syracuse division of the Empire United Railways and in 1915 assistant general manager of the Empire United Railways with headquarters at Syracuse. Following the breaking up of the original Empire United system he became connected with the Peter Smith Heater Company. Mr. Prather was a typical hard-working American who acquired his technical and general education through study at night. His kindly personality endeared him to all who knew him, whether they were below or above him in rank.

## Construction News

Construction News Notes are classified under each heading alphabetically by States. An asterisk (\*) indicates a project not previously reported.

### Recent Incorporation

\*Fredericton, N. B.—Application for a charter will be made for the construction of a new line from St. John Valley Road near Pokiok to a connection with the proposed Eastern Maine Railway at a point near the international boundary at North Lake in Orient, Aroostook County, 24 miles. It is proposed to ask for a charter to generate, use and sell hydroelectric power. The Eastern Maine Railway, Bangor, Me., is interested.

### Franchises

Los Angeles, Cal.—The City Council of Los Angeles will advertise the sale of two street railway franchises in Los Angeles, one being for the operation of the Temple Street line and the other for the operation of the Maple Avenue line. Both franchises cover lines long in operation by the Los Angeles Railway.

Venice, Cal.—The City Council of Venice will advertise the sale of a ten-year franchise to operate an electric railway on the ocean front.

### Track and Roadway

Birmingham-Tidewater Railway, Birmingham, Ala.—It is reported that this company will construct additional tracks from Pratt City to Ensley.

\*Tennessee Coal, Iron & Railroad Company, Mobile, Ala.—It is reported that the Tennessee Coal, Iron & Railroad Company will build 1½ miles of electric railway to connect with the Mobile Light & Railroad Company's tracks, to provide service to the new Chickasaw Shipbuilding Plant. George Gordon Crawford, Birmingham, president.

Washington Railway & Electric Company, Washington, D. C.—Clarence P. King, president of the Washington Railway & Electric Company, on Feb. 28 asked the permission of the Public Utilities Commission of the District of Columbia to construct a single-track loop about the triangular block bounded by Twelfth, H and Thirteenth Streets Northwest for Washington, Baltimore & Annapolis Railway cars. According to the plan, Washington, Baltimore & Annapolis cars would leave New York

Avenue and Twelfth Street, pass south to H, west on H to Thirteenth and back to New York Avenue. This would permit unloading and waits on H Street and would not interfere with city cars, as is now the case on New York Avenue between Fourteenth and Fifteenth Streets. Use of the ground floor of the Masonic Temple as a station and waiting room is proposed. Mr. King said it would be necessary to widen the streets, the expense to be borne by the company. He asks prompt action. John A. Beeler, consulting engineer, recommended to the commission that Washington, Baltimore & Annapolis cars be removed from the Columbia line tracks and that the city terminal be located at Fifteenth and H Streets, Northeast.

\*Chatham County Traction Company, Savannah, Ga.—This company proposes to construct a line to the Brampton tract of the Foundation Shipbuilding Company. All material for the line is on hand. H. C. Foss, secretary of the Savannah Electric Company, is reported interested.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii.—This company contemplates the relocation of its tracks on King Street to the center of the street.

St. Joseph Valley Railway, Elkhart, Ind.—It is reported that an extension may be built of the St. Joseph Valley Railway Company's line from Elkhart to Toledo.

Boston (Mass.) Elevated Railway.—Orders have been placed by the Boston Elevated Railway with the Union Switch & Signal Company, Swissvale, Pa., for material required for the signaling system in connection with the extension of its lines to Everett. The new work consists of a complete revision of the interlocking at tower "A," Sullivan Square; fourteen automatic block signals between Sullivan Square and Everett, and mechanical interlocking at Everett. A new electro-pneumatic interlocking machine, having a seventy-nine-lever frame, will be installed at tower "A." Provision is being made in the final scheme for operating all switches in the terminal and yards from this machine. Style "N" light signals will be used throughout. Alternating current is to be used for the control of all switches and automatic stops and for the control and operation of all signals, track circuits, relays and indicators. Model 15 double element track relays are being provided on all track circuits.

Manufacturers Railway, St. Louis, Mo.—The Board of Public Improvements of St. Louis has granted a permit for the electrification in part of the Manufacturers Railway. Current will be furnished from the Keokuk dam.

**Ohio Electric Railway, Springfield, Ohio.**—A movement has been started by the City Commissioners of Middletown to compel the Ohio Electric Traction Company to construct a permanent bridge south of the city which will withstand high waters. None of the structures erected in the past have been substantial, and it was pointed out that such bridges as were constructed are a menace to the public safety.

**Oklahoma (Okla.) Railway.**—According to a report from Oklahoma, J. W. Shartel, vice-president and general manager of the Oklahoma Railway, states that extensive interurban railway construction in Oklahoma will be undertaken as soon as the war ends, all of the lines planned under various auspices connecting more or less directly with Oklahoma City, which would be a center of interurban roads in that part of the country. The Oklahoma Railway will build from 30 to 40 miles of interurban railway every year. Plans for such extensions have been practically completed, but financing at present is out of the question, and it is doubtful whether materials could be obtained even if the money could be had. An extension of the Guthrie line is to be made to Stillwater and Cushing, about 40 miles, and the Norman line is to be extended to Lexington and Purcell. It is also proposed to construct a line from Oklahoma City to Shawnee, 40 miles.

**Oklahoma Union Railway, Tulsa, Okla.**—Announcement has been made that this company's extension from Tulsa to Sapulpa will be placed in operation by April 1.

**Pennsylvania Railroad, Philadelphia, Pa.**—The finishing touches are now being put on the electrification of the Philadelphia-Chestnut Hill branch of the Pennsylvania Railroad and April 1 has been set as the tentative date for the formal opening of the line. The Chestnut Hill line is 14 miles long and has been under construction since September, 1913. Originally the cost was placed at \$1,250,000. The war acted both to postpone the work and increase the cost to about \$1,500,000.

**Dallas (Tex.) Railway.**—Plans for changes in the street railway facilities at the State Fair Grounds so twenty cars can be loaded or unloaded at once and as many as fifty cars can be kept immediately available for rush crowds during the State Fair or at other times have been announced by Richard Meriwether, general manager of the Dallas Railway. Preliminary details have been arranged, blue prints and specifications have been made and the special work for the new loop and switches at the Fair Grounds has been ordered, to insure early completion of the work. These changes at the Fair Park will be part of the general plan for rerouting the car lines in that part of Dallas. The total cost of the changes and improvements, including the new car line out Second Avenue from First and Parry Avenues, just south of Fair Park, to the city limits a few blocks north of the Texas & New Orleans Railroad, will be \$121,000. Two and

one-half miles of new track and a great deal of special work in the way of switches and curved tracks will be laid. The work on the Second Avenue extension, which will serve a section of Southeast Dallas heretofore without car service, will begin as soon as the city can complete the work of widening the street and laying service pipes. The work at the Fair Grounds will begin as soon as the special work arrives, probably within sixty days. As part of this work, the railway company also will remove its tracks from Exposition Avenue, alongside the Fair Grounds, so that Fair Park may be extended across that street to include the old Gaston Park, now the property of the city.

**Dallas (Tex.) Southwestern Railway.**—At a recent meeting of the board of directors of the Chamber of Commerce of Dallas, the committee on railways and transportation indorsed the proposed interurban line from Dallas to Irving and recommended that the Chamber of Commerce and Manufacturers' Association stand ready to co-operate with the Dallas Southwestern Traction Company in procuring such right-of-way as was necessary to construct the road. E. P. Turner, president. [Dec. 29, '17.]

**Houston (Tex.) Municipal Railway.**—The City Council of Houston has awarded a contract to the Houston Construction Company at \$59,000 for the construction of the first unit of the proposed municipal line from a connection with the International & Great Northern Railroad north of Harrisburg Boulevard to the plant of the Sinclair Gulf & Refinery Company east of Simms Bayou, 4 miles.

### Shops and Buildings

**Pacific Electric Railway, Los Angeles, Cal.**—A new station will be built by the Pacific Electric Railway at Los Angeles Harbor.

**Union Street Railway, New Bedford, Mass.**—A contract has been awarded to J. W. Bishop Company, Worcester, by the Union Street Railway for the construction of the superstructure of a building to be used for a boiler house and turbine room. The structure will be 98 ft. x 126 ft., two stories, of brick and steel construction, and will cost about \$135,000.

**Kansas City (Mo.) Railways.**—This company will erect a one-story repair shed to cost \$8,200.

**Public Service Railway, Camden, N. J.**—The carhouse of the Public Service Railway at Camden was badly damaged by fire on March 3 and eighteen double-truck cars of the company were destroyed. The loss is estimated at about \$150,000.

**Dayton & Troy Electric Railway, Dayton, Ohio.**—The City Commission of Dayton has granted permission to the Dayton & Troy Electric Railway to erect a shelter station on the west side of Keowee Street, opposite Leo Street

**Toronto & York Radial Railway, Toronto, Ont.**—The carhouse of the Toronto & York Radial Railway on the Kingston Road, East Toronto, together with four cars, was recently destroyed by fire. The loss is estimated at \$25,000.

**Three Rivers (Que.) Traction Company.**—A new station will be built by the Three Rivers Traction Company at Gervais and St. Philippe Streets, Three Rivers, at a cost of about \$3,000.

### Power Houses and Substations

**San Diego Consolidated Gas & Electric Company, San Diego, Cal.**—The Railroad Commission of California has granted authority to the San Diego Consolidated Gas & Electric Company to purchase the Del Mar Water, Light & Power Company, which will be immediately connected with the system of the San Diego company.

**Gary (Ind.) Street Railway.**—It is reported that this company will construct a new power station at Eleventh Avenue, Gary.

**Sioux City (Ia.) Service Company.**—The improvements begun last spring by the Sioux City Service Company and costing approximately \$500,000 are practically completed. A greatly increased capacity for supplying power and carrying on the business of the organization with more efficiency is the result of the extensive addition of equipment, according to E. L. Kirk, general manager of the company. Among the larger items in the long list of improvements made recently are the substation installed beneath the business office in Fifth Street; a turbine and two boilers put in at the main power station, forming a complete new generating unit; new switchboards; the transmission line to Riverside, and underground work.

**Worcester & Warren Street Railway, Brookfield, Mass.**—Fire on March 4 practically destroyed the power house of the Worcester & Warren Street Railway at Brookfield. Four cars and two snowplows were destroyed. The loss is estimated at \$75,000.

**Harrisburg (Pa.) Railways.**—Three new transformers have been received by the Harrisburg Railways for installation at its substation at Reilly and Marion Streets. The substation primarily will take care of the Second, Third and Fourth Street lines, but all lines will use the power in rush hours.

**Valley Railway, Lemoyne, Pa.**—This company is installing a skip hoist ash remover at its local electric plant and it is anticipated that this work, in connection with other improvements, will be completed about April 1.

**Puget Sound Traction, Light & Power Company, Bellingham, Wash.**—This company is contemplating the erection of an electric transmission line to the Cokedale Mine.



# Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

## Census Statistics on Car Manufacture

Production of Electric Road Equipment in 1914 Valued at More Than \$10,000,000

Census figures of the production of street and electric railroad cars for 1914 by establishments engaged primarily in their manufacture have just been published. They show fourteen of these establishments, with an output of 2348 cars valued at \$8,078,348, as compared with 1922 cars in 1909 valued at \$4,602,435, and 3966 cars in 1904 valued at \$8,302,512. In addition to the cars reported for this industry in 1914, there were 194 electric railway cars, valued at \$711,198, built by establishments engaged primarily in the manufacture of steam railroad cars; 304 cars, valued at \$811,104, by repair shops of electric railway companies; and seventeen cars,

Table II shows, by character of construction, the number of each class of cars built in 1914, together with the value.

Class	TABLE II Number				
	Total	All Wood	Steel Under-frame	Steel Body with Wood Interior	All Steel
Electric railway, total	2,365	434	1,083	560	288
Passenger	2,174	360	1,022	523	269
Freight	66	34	18	6	8
Other varieties	108	27	43	28	10
Steam railroad	17	13	....	3	1

Table III summarizes the statistics of establishments engaged in the manufacture of electric railway cars for

## Administration Statement on Coal Price Regulation

Fuel Administration to Announce Decision on All Applications for Revision Made Prior to April 1

In connection with the government regulation of coal prices the following statement is authorized by the United States Fuel Administration:

"The regulation of coal prices by the Fuel Administration is the first attempt ever made, at least on a large scale, by the United States government to fix and establish prices for any of the great industries. It is very important to both the public and the coal industry that the prices so fixed should be based on accurate information as to the conditions prevailing in different fields, and that, when once this information has been received, the right principles should be employed in making use of this information.

"The Fuel Administration believes that it has devised a speedy and accurate method for using the cost information which it has in hand, and that it has worked out the fundamental principles which should guide it in considering applications for modifications of coal prices.

"It is the purpose of the Fuel Administration to announce decisions on all applications for price revisions now before it, prior to April 1, 1918, and, prior to that time, to make such changes in the classification as seem to be necessary, in order to relieve uncertainty on this score as far as possible before the beginning of the new coal year.

"By this statement, the Fuel Admin-

istry since 1889, but the number of wage earners, capital, and value of products have increased very materially. For the decade 1904-1914 there was a decrease in the average number of wage earners and in value of products of 18.8 per cent and 3.2 per cent, respectively.

TABLE I				
Product	1914	1909	1904	
Total value <sup>1</sup>	\$10,494,953	\$7,809,866	\$10,844,196	
Electric railway:				
Number	2,348	1,922	3,966	
Value	\$8,078,348	\$4,602,435	\$8,302,512	
Passenger:				
Number	2,174	1,787	3,677	
Value	\$7,439,906	\$4,346,098	\$7,878,470	
Closed:				
Number	1,876	1,323	2,621	
Value	\$6,802,764	\$3,500,781	\$5,777,257	
Combination:				
Number	143	369	502	
Value	\$383,694	\$704,309	\$1,240,864	
Open:				
Number	155	95	554	
Value	\$253,448	\$141,088	\$860,349	
Freight, express and mail:				
Number	66	92	10	
Value	\$174,334	\$179,293	\$24,022	
Other varieties:				
Number	108	43	273	
Value	\$464,108	\$77,044	\$400,020	
Steam railroad:				
Number	17	167	136	
Value	\$72,034	\$111,813	\$59,663	
All other products, value	\$2,344,571	\$3,095,618	\$2,482,021	

<sup>1</sup>In addition, 515 cars, valued at \$2,084,802, in 1914; 850 cars, valued at \$2,660,674, in 1909; and 418 cars, valued at \$994,654, in 1904, were made as a subsidiary product by establishments engaged primarily in other industries.

<sup>2</sup>Includes thirty-eight horse cars, valued at \$29,182.

valued at \$562,500, by establishments engaged primarily in other industries, making a total of 515 cars, valued at \$2,084,802, as compared with 850 cars, valued at \$2,660,574 in 1909.

Table I shows the number and value of cars constructed in the industry, by class, for 1914, 1909 and 1904.

There were fewer electric railway cars built in 1914 than in 1904, a decrease of 40.8 per cent, while the value of these cars shows a decrease of only 2.7 per cent. The average value of electric railway cars in 1904 was \$2,093 and in 1914, \$3,441. In 1914, 12.2 per cent of the electric railway cars were all steel; 23.7 per cent were steel body with wood interior; 46.1 per cent steel underframes, and 17.9 per cent, all wood.

each census from 1889 to 1914, and gives percentages of increase.

There has been very little change in the number of establishments in the in-

	TABLE III Number or Amount				
	1914	1909	1904	1899	1889
Number of establishments	14	14	14	26	17
Persons engaged	4,286	4,005	4,997	3,736	( <sup>1</sup> )
Proprietors and firm members	....	1	3	7	( <sup>1</sup> )
Salaried employees	446	421	264	144	( <sup>1</sup> )
Wage earners (average number)	3,840	3,583	4,730	3,585	1,785
Capital	\$14,751,582	\$14,167,999	\$12,975,703	\$7,615,397	\$2,468,315
Salaries and wages	3,199,674	2,770,566	3,237,825	2,185,379	1,174,790
Salaries	732,617	593,617	398,246	234,503	( <sup>1</sup> )
Wages	2,467,027	2,176,949	2,839,579	1,950,876	( <sup>1</sup> )
Paid for contract work	129,904	233,508	....	3,000	( <sup>1</sup> )
Cost of materials	6,349,779	4,260,470	5,341,444	3,966,863	1,699,235
Value of products	10,494,953	7,809,866	10,844,196	7,305,368	3,302,115
Value added by manufacture (value of products less cost of materials)	4,145,174	3,549,396	5,502,752	3,338,505	1,602,880

<sup>1</sup>Figures not available.



Commutator Brushes Subject to Graphite Supply

An Active Market Existing—Quotations Take a Sharp Jump Upward—Deliveries Prompt

While a few manufacturers of commutator brushes state that the trade is steady and that there have been advances of no particular consequence, the majority declare the market is extremely active. With this variance of opinion, perhaps it may be well to consider the opinion of a maker who is of the belief that it is necessary to know what is required in order to fill specifications with the proper brushes. In other words, "anything will do" is no longer permissible; for the reason, as this brush man asserts, "cheap brushes are put on the motor, the dope runs out, and the sparks bore and wear streaks in the commutator, and all sorts of disorders take place." The demand for commutator brushes has grown steadily, the sale increase being fully 30 per cent over last year's selling record. After an apparatus is installed, there is a continuous call for brushes, so the market is never stagnant or at a low level.

Advances in graphite from time to time have occasioned mark-ups in the price of brushes. On Oct. 1 last the increase was fully 50 per cent, which was considered by the trade an extraordinary price enhancement. Since then, so far as can be ascertained, no further price advance has been attempted. Graphite is short of the market, is high and possibly may reach a still higher quotation, if the word of responsible brush manufacturers is to be accepted as authoritative. Brush makers handle their grade of graphite as a secondary finished product, the bakers of the metal being the primary handlers.

Ceylon graphite, the best grade, sells for \$160 a ton, and under the British embargoes the importations are curtailed. The market is easing off slightly, but the producers are sold up to 1919. Prices to consumers of brushes are made on the quantity basis. For example, buyers of 10 brushes of divers

sizes are quoted net on the list. On 50 to 100 brushes of a miscellaneous character 20 per cent is given. On 1000 brushes of the same size and quality 40 per cent, and an inside special of 50 and 10 is granted when larger orders are placed.

So far the greater number of commutator brush manufacturers have anticipated their requirements on graphite and have had an ample stock for manufacturing. This was the condition for several years and up to the present time. It is now admitted nearly everyone is buying at the market, with possibly a couple of exceptions. Such factories have fortunate connections, thus enabling them to get raw material, possibly not at any better price, but insuring a sufficiently large supply to meet the requirements of their trade contracts.

Deliveries of brushes are prompt out of stock and go forward either by express or parcel post. With the growing demand, however, the manufacturers, while apparently confident of the possibilities of the future, still confess, if current conditions continue, there may be a reversal not altogether pleasing or satisfactory either in price or deliveries.

Cost of Ball Bearings Going Higher

Deliveries Expected to Become Longer Owing to the War Demands of the Government

Deliveries of ball bearings are expected to get worse during the next three months at least owing to the war demands of the government on the manufacturers. Indications are that prices will advance owing to the condition of supply and price of raw and manufacturing materials. Owing to the increasing volume of rejections, the cost of steel is much greater to the manufacturers. The cost of labor has gone up in the past two years from 50 per cent of ball production cost to 60 per cent and is still advancing. It can thus be imagined to what extent labor costs have risen when everything else has advanced so much. Files and grinding machinery, diamonds for truing wheels, etc., have been increasing very rapidly and represent a real item of cost.

The most pertinent facts of the market are, therefore, a greatly curtailed available production for commercial purposes, increasing delay in deliveries, and advancing prices.

Rolling Stock

New York Municipal Railway Corporation, Brooklyn, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of Feb. 23 as having ordered 100 new cars for its subway system has specified the appended details for this equipment. No delivery date, however, is designated.

Number of cars ordered.....	110
Name of road.....	New York Municipal Ry.
Date order was placed.....	Feb. 26, 1918
Builder of car body.....	Am. Car & Foundry Co.
Type of car.....	Subway
Seating capacity.....	78-90
Weight (total).....	86,160-light lb.
Height over bumpers.....	47 ft. 0 in.
Length over vestibule.....	67 ft. 0 in.
Length over vestibule.....	64 ft. 7 1/4 in.
Width over all.....	10 ft. 0 in.
Height, rail to trolley base.....	12 ft. 2 in.
Body.....	Steel
Interior trim.....	Steel and Agasote
Headlining.....	Agasote
Roof.....	Arch
Air brakes.....	Westinghouse, type A. M. U. E.
Axles.....	New York Municipal Railway
Bumpers.....	Hedley Anti-Climber
Control type.....	Westinghouse A. B. F.
Couplers.....	Westinghouse
Curtain fixtures.....	Curtain Supply Co., No. 089
Curtain material.....	Pantasote
Designation signs.....	Elec. Ry. Supplies Co.
Gears and pinions.....	Gen. Elec. Co., grade F.
Hand brakes.....	Peacock, with Kling Shieve
Heaters.....	Peter Smith
Journal boxes.....	McCord
Motors, type and No.....	Gen. Elec. Co., 248-A
Motors.....	Outside or inside hung, inside
Sash fixtures.....	Edwards
Seats, style.....	Hale & Kilburn, cross and longitudinal
Seating material.....	Rattan
Spring.....	Elliptic and spiral
Trolley wheels or shoes.....	Third-rail shoe, New York Municipal Ry.
Trucks, type.....	New York Municipal Ry. A-55
Ventilators.....	Perry
Wheels (type and size).....	32 in. and 34 1/4 in.

Harrisburg (Pa.) Railways, referred to as ordering five new cars in the ELECTRIC RAILWAY JOURNAL of Feb. 23 for its road, specify the following

details for this equipment, which were to be delivered March 1:

Number of cars ordered.....	5
Name of road.....	Harrisburg Ry. Co.
Date order was placed.....	Sept. 23, 1917
Date of delivery.....	March 1, 1918
Builder of car body.....	J. G. Brill Co.
Type of car.....	Semi-convertible
Seating capacity.....	48
Weight (total).....	40,000 lb.
Length over bumpers.....	43 ft. 10 in.
Length over vestibule.....	42 ft. 10 in.
Width over all.....	8 ft. 2 in.
Height, rail to trolley base.....	12 ft. 9/16 in.
Body.....	Steel
Interior trim.....	Cherry
Headlining.....	Agasote
Roof.....	Arch
Air brakes.....	Westinghouse
Axles.....	Forged steel
Bumpers.....	Hedley Anti-Climber
Car trimmings.....	Bronze
Control, type.....	K-35
Curtain fixtures.....	National "B"
Curtain material.....	Pantasote
Designation signs.....	Keystone
Door operating mechanism.....	Nat. Pneumatic
Fare boxes.....	None
Fenders or wheelguards.....	Own make
Gears and pinions.....	Nuttall Co.
Hand brakes.....	Peacock
Heaters.....	Consolidated
Headlights.....	Golden Glow
Journal boxes.....	J. G. Brill Co.
Lightning arresters.....	Westinghouse
Motors, type and number.....	Four 514-C
Motors.....	Outside or inside hung, outside
Registers.....	International
Sanders.....	National
Sash fixtures.....	Edwards
Seats, style.....	Hale & Kilburn
Seating material.....	Rattan
Step treads.....	American abrasive
Trolley catchers or retrievers.....	Kuntson
Trolley base.....	Nuttall Co.
Trolley wheels or shoes.....	Kalamazoo
Trucks, type.....	27 M. C. B. Brill
Ventilators.....	Railway Utility
Wheels (type and size).....	33 in. cast iron

Philadelphia (Pa.) Rapid Transit Company will place in its service the 100 new passenger cars ordered recently from the J. G. Brill Company by the Emergency Fleet Corporation. Possibly the additional rolling stock may reach 150 in number. The cars are of the same general type now being operated by the Philadelphia company. They will be forty feet long, with Gen-

(Concluded from page 486)

istration does not wish to be understood as stating that the examination of the prices now being made will complete its price work. On the contrary, the administration will continue to collect and study facts relating to the cost of production of coal and the prices at which it is sold. It will make such further readjustments from time to time as are necessary to keep the prices on a scale fair to the public, fair to the coal industry, and sufficiently high to encourage production. It hopes, also, to take measures in the very near future to encourage and insist upon the use of less wasteful methods of mining, the sale of clean coal, and the more definite recognition of the different qualities of coal in the government prices."

eral Electric Company equipment, and the cost is about \$6,000 each.

Ocean Shore Railroad Company, San Francisco, Cal., is reported as being in the market for new cars.

Public Service Railway, Newark, N. J., lost eighteen double-truck cars in a fire on March 3 at the Camden car-house.

Tri-City Railway.—This company has received the first of twenty cars purchased from the Chicago Surface Lines in January. Four others will be received and placed into service at once.

Worcester & Warren Street Railway Company, Brookfield, Mass., had its power house practically destroyed by fire on March 4. Four cars, one new and valued at \$5,000, besides two snow ploughs, were burned. The entire loss is estimated at \$75,000, fully covered by insurance. Defective insulation is reported to have caused the fire. The road suspended service Jan. 16, and the power house has not been in use since Dec. 16.

Toronto & York Radial Railway, Toronto, Canada, on Feb. 24 had its Scarborough divisional carhouse totally destroyed by fire, together with four cars. The damage is placed at \$25,000. The cars were valued at \$5,000 a piece. The loss is covered by insurance. On Feb. 5 this company also had six inter-urban cars destroyed by fire, which also burned its Metropolitan division carhouse, as mentioned in the *ELECTRIC RAILWAY JOURNAL* of Feb. 16.

### Professional Note

Robert H. Whitten, formerly with the Public Service Commission, First District, New York, has opened an office for consulting work on city planning at 277 Broadway, New York. Mr. Whitten has had some five years' experience in city planning and zoning work in New York City, following his connection with the New York Public Service Commission, First District. He is the author of an authoritative treatise on the valuation of public service corporations and also of a monograph on the regulation of public utilities in Great Britain. Mr. Whitten is a member of the American City Planning Institute.

### Trade Notes

George Siess, who has been stores manager of the Cleveland office of the Western Electric Company, was recently appointed assistant manager of that office.

Waverly, Sayre & Athens Traction Company, Waverly, N. Y., has equipped its one-man cars with the Johnson fare box, furnished by the National Railway Appliance Company.

J. B. Howell of the sales department of the Bound Brook Oil-less Bearing Company has entered active service in the United States Army and is now training at Camp Dix.

W. W. Briggs has resigned as general agent of the Great Western Power Company to become manager of the New York division of the Westinghouse Lamp Company, taking effect April 1.

Guide & Signal Light Company, Indianapolis, Ind., has been incorporated by Richard McClellan, L. Greenburg and Robert Eaglesfield. The company is capitalized at \$100,000 and proposes to manufacture electrical devices.

Nelson P. Hall has been appointed district sales manager for the Chicago territory of the Van Dorn & Dutton Company. He was formerly connected with the sales force of the Electric Service Supplies Company of Chicago.

Moloney Electric Company, Ltd., Toronto, Can., announces that it has opened a branch office and warehouse at Halifax, N. S., for the Maritime Provinces. E. A. Seath, who has been transferred from the Montreal office, will have charge of that territory.

Raymond W. Murphy, who was until recently in charge of the Pacific Coast offices of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has been transferred to the Philadelphia office of the company, where he is assistant manager.

J. D. Todd, who until recently was connected with the Western Electric Company at Kansas City, Mo., as assistant sales manager, became associated with the Missouri Valley Electric Company, Jan. 1, as vice-president and manager. Mr. Todd will make his headquarters at Kansas City.

Stephen A. Staeger announces the dissolution of the firm of Staeger & Dewey, and that he will continue in consulting engineering practice, with offices in the Light & Power Building, Watertown, N. Y.

War Trade Board, Washington, D. C., in an official announcement states that after Feb. 1 a new export application form will be used in place of all forms hitherto in existence. It will be the only application form in use. Copies of the blanks, with information pertaining to their use and other pertinent directions, may be had on application to the board.

### New Advertising Literature

Stow Manufacturing Company, Binghamton, N. Y.: Bulletin entitled "Portable Tools of Proven Value."

Allis-Chalmers Manufacturing Company, Milwaukee, Wis.: Circular descriptive of its type "S" centrifugal pumping unit.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.: Leaflet 3998 descriptive of the company's automatic railway substations.

Vulcan Steel Products Company, New York, N. Y., is publishing a spirited illustrated monthly house organ entitled *Vulcan*. It is a journal of co-operation and help for the Vulcan company's interests, particularly in its rapidly developing export trade.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.: Technical information regarding Bakelite Micarta-D gears is contained in a pamphlet recently published by the company. The distinctive feature of this material for noiseless gears and pinions are listed, together with its physical properties. Methods of turning and drilling and gear cutting are described and illustrated with many half-tones and drawings. Methods of attaching to the driving shaft which have proved suitable for gears of all sizes are shown and tables of pitch, teeth and other gear data are also given. There are formulas for the horsepower rating, the amount of power which can be transmitted through press fit and for calculating other variables in gear practices.

### RAILWAY MATERIALS

	Feb. 27	March 6
Rubber-covered wire base, New York, cents per lb.	27-30	30
Weatherproof wire (100 lb. lots), cents per lb.	28 1/4 to 34 1/4	28 1/4 to 34 1/4
New York	28 1/4 to 34 1/4	28 1/4 to 34 1/4
Weatherproof wire (100 lb. lots), cents per lb.	33 1/2 to 38	33.42 to 38.35
Chicago	33 1/2 to 38	33.42 to 38.35
Rails, heavy, Bessemer, Pittsburgh	\$55.00	\$55.00
Rails, heavy, O. H. Pittsburgh, per gross ton	\$57.00	\$57.00
Wire nails, Pittsburgh, per 100 lb.	\$3.50	\$3.50
Railroad spikes, 9/16 in., Pittsburgh, per 100 lb.	\$3.90	\$3.90
Steel bars, Pittsburgh, per 100 lb.	\$5.00	\$5.00
Sheet iron, black (24 gage), Pittsburgh, per 100 lb.	\$4.85	\$4.85
Sheet iron, galvanized (24 gage), Pittsburgh, per 100 lb.	\$5.80	\$5.80
Galvanized barbed wire, Pittsburgh, cents per lb.	\$4.35	\$4.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.	\$3.95	\$3.95
Cement (carload lots), New York, per bbl.	\$2.25	\$2.25
Cement (carload lots), Chicago, per bbl.	\$2.31	\$2.31
Cement (carload lots), Seattle, per bbl.	\$2.65	\$2.65
Linseed oil (raw, 5 bbl. lots), New York, per gal.	\$1.35	\$1.43
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	\$1.36	\$1.44
White lead (100 lb. keg), New York, cents per lb.	10	10
Turpentine (bbl. lots), New York, cents per gal.	46 1/2	45 1/2

\*Nominal. †Government price in 50 ton lots f.o.b. plant

### NEW YORK METAL MARKET PRICES

	Feb. 27	March 6
Copper, ingot, cents per lb.	23 1/2	23 1/2
Copper wire base, cents per lb.	27	27
Lead, cents per lb.	7 1/4	7 1/4
Nickel, cents per lb.	50	50
Spelter, cents per lb.	8	7.875
Tin, Straits, cents per lb.	\$85.00	\$85.00
Aluminum, 98 to 99 per cent, cents per lb.	35-37	42

### OLD METAL PRICES—NEW YORK

	Feb. 27	March 6
Heavy copper, cents per lb.	22	22
Light copper, cents per lb.	19 1/2	19 1/2
Red brass, cents per lb.	18	18
Yellow brass, cents per lb.	13	13
Lead, heavy, cents per lb.	6	6
Zinc, cents per lb.	5 1/2	5 1/2
Steel car axles, Chicago, per net ton	\$42.41	\$42.41
Old car wheels, Chicago, per gross ton	\$30.00	\$30.00
Steel rails (scrap), Chicago, per gross ton	\$35.00	\$35.00
Steel rails (relaying), Chicago, per gross ton	\$60.00	\$60.00
Machine shop turnings, Chicago, per net ton	\$17.00	\$17.00



## In Greater New York 8847 Peacock Brakes are in daily service

on all types of cars, from the light single truck  
Storage Battery Cars to the large Subway  
Cars of the New York Municipal Railway

Where traffic congestion is the greatest;

Where operating conditions are the hardest;

Where stops are most frequent:

There you will find the largest number of  
Peacock Brakes. On one line alone the turn-  
ins for brake trouble decreased 75%. Think  
of the hours of labor saved. With labor more  
costly than ever before you cannot afford to  
go without Peacock Brakes now.



The Eccentric  
Drum

**National Brake Co.**  
Buffalo, N. Y.

# Bankers and Engineers



## STONE & WEBSTER

Industrial Plants and Buildings, Steam Power Stations,  
Water Power Developments, Substations, Gas Plants,  
Transmission Lines, Electric and Steam Railroad Work.  
NEW YORK BOSTON CHICAGO

## THE J. G. WHITE COMPANIES

ENGINEERS  
FINANCIERS



CONTRACTORS  
OPERATORS

43 EXCHANGE PLACE  
LONDON

NEW YORK  
CHICAGO

## SANDERSON & PORTER ENGINEERS

REPORTS • DESIGNS • CONSTRUCTION • MANAGEMENT  
HYDRO-ELECTRIC DEVELOPMENTS

RAILWAY, LIGHT AND POWER PROPERTIES  
CHICAGO NEW YORK SAN FRANCISCO

## WOODMANSEE & DAVIDSON ENGINEERING CO.

### ENGINEERS

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ENGINEERS—CONSTRUCTORS  
ELECTRICAL—CIVIL—MECHANICAL  
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## H. M. Byllesby & Company, Inc.

NEW YORK CHICAGO TACOMA  
Trinity Bldg. No. 208 So. La Salle St. Washington

Purchase, Finance, Construct and Operate Electric Light,  
Gas, Street Railway and Water Power Properties.  
Examination and reports. Utility Securities Bought and Sold.

ALBERT S. RICHEY  
ELECTRIC RAILWAY ENGINEER  
WORCESTER POLYTECHNIC INSTITUTE  
WORCESTER, MASSACHUSETTS

## A. L. DRUM & COMPANY CONSULTING AND CONSTRUCTING ENGINEERS

VALUATIONS AND FINANCIAL REPORTS  
CONSTRUCTION AND MANAGEMENT  
OF ELECTRIC RAILWAYS

76 West Monroe St.

CHICAGO, ILL.

## JOHN A. BEELER

OPERATING AND RATE INVESTIGATIONS  
TRAFFIC SURVEYS AND SCHEDULES  
52. ELECTRIC RAILWAY MANAGEMENT 343  
VANDERBILT SUPERVISION OF CONSTRUCTION District Bldg.  
AVE. ENGINEERING Washington,  
NEW YORK APPRAISALS D. C.

## JAMES T. SWAN CERTIFIED PUBLIC ACCOUNTANT

60 STATE ST., BOSTON

SPECIALIST IN TRANSPORTATION STATISTICS  
AND RATE INVESTIGATIONS

## D. C. & WM. B. JACKSON ENGINEERS

CHICAGO BOSTON  
HARRIS TRUST BLDG. 248 BOYLSTON ST.  
Plans, Specifications, Supervision of Construction  
General Superintendence and Management  
Examinations and Reports  
Financial Investigations and Rate Adjustments

## Ford, Bacon & Davis, Engineers.

115 BROADWAY

New Orleans NEW YORK San Francisco

## Sloan, Huddle, Feustel & Freeman Consulting Engineers

Analytical Studies of financial and operating conditions,  
appraisals and rate adjustments of electric railway and  
all public utility properties.

BOSTON, 14 Kilby Street CHICAGO, Conway Bldg.

## HERBERT A. CLARKE

Electric Railway Engineer

536 Thurston Avenue, Ithaca, N. Y.

Specializes in assisting counsel and in preparation  
of increased fare and valuation cases before Com-  
missions.

When writing the advertiser for information or prices, a men-  
tion of the Electric Railway Journal would be appreciated.

ELECTRICAL TESTING LABORATORIES  
Electrical, Photometrical and  
Mechanical Testing.

80th Street and East End Ave., New York, N. Y.

## THE P. EDW. WISCH SERVICE

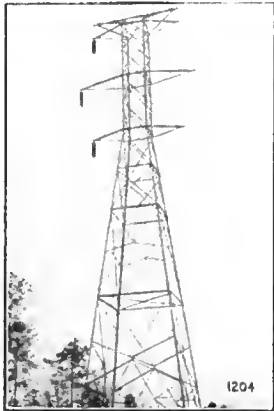
Suite 1710 DETECTIVES Suite 715  
Park Row Bldg., New York Board of Trade Bldg., Boston

Scotfield Engineering Co. Consulting Engineers  
PHILADELPHIA, PA.  
POWER STATIONS GAS WORKS  
HYDRAULIC DEVELOPMENTS ELECTRIC RAILWAYS

# AMERICAN BRIDGE COMPANY

## HUDSON TERMINAL-30 CHURCH STREET, NEW YORK

*Manufacturers of Steel Structures of all classes  
particularly BRIDGES AND BUILDINGS*



Transmission Towers at Birmingham, Alabama. Alabama Power Company.

### SALES OFFICES

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Boston, Mass., John Hancock Bldg.	Salt Lake City, Utah, Walker Bank Bldg.
Baltimore, Md., Continental Trust Bldg.	Duluth, Minn., Wolvin Building
PITTSBURGH, PA., Frick Building	Minneapolis, Minn., 7th Ave & 2nd St., S.E.
Buffalo, N. Y., Marine National Bank	
Cincinnati, Ohio, Union Trust Building	
Atlanta, Ga., Candler Building	
Cleveland, Ohio, Guardian Building	
Detroit, Mich., Beecher Ave. & M. C. R. R.	
CHICAGO, ILL., 208 South La Salle St.	

### Pacific Coast Representative:

U. S. Steel Products Co. Pacific Coast Dept.  
SAN FRANCISCO, CAL., Rialto Building  
Portland, Ore., Selling Building  
Seattle, Wash., 4th Ave. So. Cor. Conn. St.

### Export Representative:

United States Steel Products Co., 30 Church St., N. Y.

## DREW POLE SLEEVES make old steel poles safe and sightly at small cost

Wherever you have a steel pole that is weakened at the ground line, you can make an immediate and important saving. You can easily secure 20 years additional life from every steel pole on your property. In this day of high material and labor cost—can you afford to neglect this opportunity?

### Easily and Quickly Installed

Only the tools used in everyday line construction are needed. No outlay for special equipment is required. Three men in only twenty minutes' time can do the job from start to finish.

*Illustrated literature, cost data and prices  
await your request. Send for them.*

## Drew Electric & Mfg. Co.

Offices Indianapolis, Ind. Works  
REPRESENTATIVES IN PRINCIPAL CITIES



View of the pole base after Drew Pole Sleeve has been put in place and job completed, thereby giving this pole that would have required replacement, at least 20 years of additional service. On this job an immediate saving of \$42.55 was made and future pole service secured for only 53 cents per year.

**DREW OVERHEAD LINE MATERIAL IS STANDARD ON  
KEENLY MANAGED ROADS - - - GET QUOTATIONS**

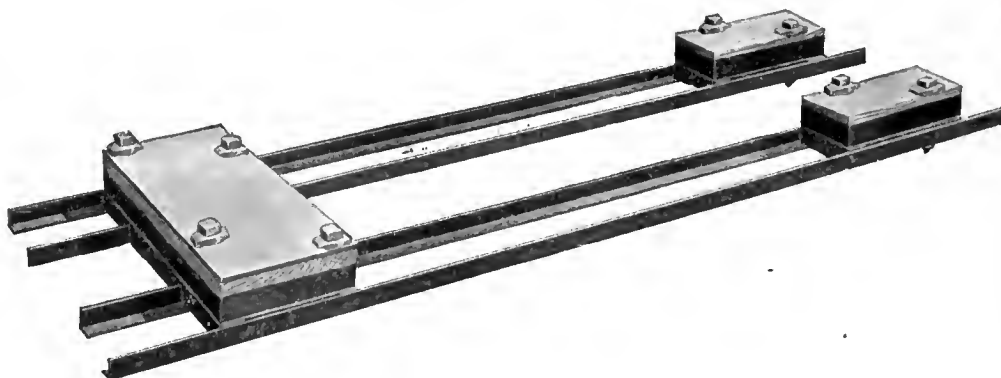




# Where Rails Join

This is the point in the track that fails first. With ordinary ties, even the loosening of a fish plate will start the joint to knocking.

Here is a sure method of making the tie bind the rail ends permanently to both surface and alignment.



The Dayton Mechanical Joint Tie shown in this illustration is our answer to the "loose joint" problem. One tie block with the added security of a steel plate carries the ends of both rails. The cushion feature is here also.

It is absolutely impossible for one of the rail ends to sink even the smallest fraction of an inch below the level of the other end on the same block.

Absolutely perfect surface and alignment is the result with all the attending advantages of freedom from shocks to rolling stock, decreased noise and economy of maintenance.



**THE DAYTON MECHANICAL TIE CO.**

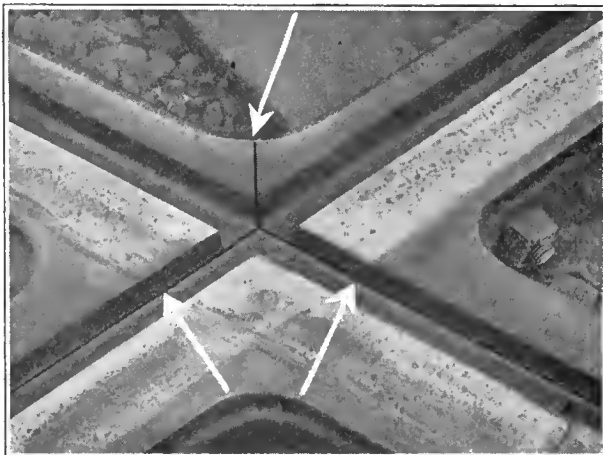
201 Third Street Arcade

DAYTON, OHIO





What Happens to a Rolled Rail Crossing



Joints in Balkwill Articulated Cast Manganese Crossings are life savers. They positively prevent breakage at flangeway intersections, permitting 100% wear

## Why Balkwill Articulated Cast Manganese Crossings Are Superior to Rolled Rail Crossings

This picture at the left shows where breaks in the main steel flange or backbone of rolled rail crossings are usually found.

These breaks are unavoidable because of the lack of flexibility of the rolled steel filler at the flangeway intersection.

In the Balkwill Articulated Cast-Manganese Crossing the difficulty is

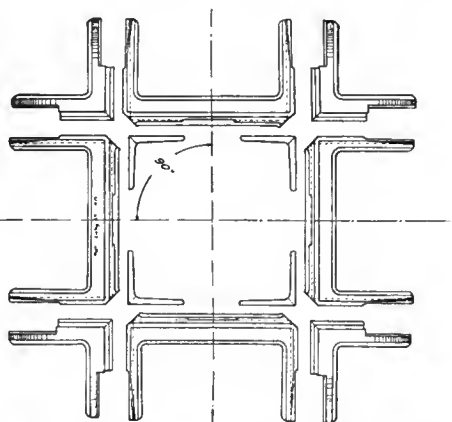
corrected by placing scientifically designed joints at the very places where breakage formerly occurred.

The lower first cost of a rolled rail crossing is therefore not a lower overall cost because it takes several rolled rail crossings to equal the life of one Balkwill Articulated Cast Manganese Crossing. Therefore the Balkwill Crossing is the cheapest in the long run. It gives

**MORE WEAR PER DOLLAR THAN ANY OTHER CROSSING YOU CAN BUY**

It saves interruptions to traffic, makes less demand on labor, which is now so scarce, and also reduces the cost of making replacements frequently.

Write us for data on existing installations. If your special work manufacturer cannot get prompt deliveries of manganese castings or has not taken out a license to manufacture these crossings, **DON'T ACCEPT A SUBSTITUTE** but write us direct and we will see that your requirements are taken care of.



Joints at the flangeway intersections of Balkwill Articulated Cast Manganese Crossings positively eliminate breakage

**Order Balkwill Articulated Cast Manganese Crossings  
Direct from Your Special Work Manufacturers**

# The Balkwill Manganese Crossing Co.

506 Williamson Building, Cleveland, Ohio



## Magnitude of Organization Makes Collier Service Standards Possible

Since it costs hundreds of dollars to conceive, design and print a single worth-while card—

Local advertising contractors simply cannot afford to give a service that makes car card advertising a source of permanent income to the railway.

Only the nation-wide magnitude of the Collier organization makes such service financially feasible because the cost of each card can be apportioned among the hundreds of Collier advertisers.

Thus only the great organization developed by Collier Service makes it possible to assure electric railways an unfailing income from car card advertising.

**Barron G. Collier**  
INCORPORATED

Candler Building

220 West 42nd Street, New York City

## Excessive Use of Brakes Means Excessive Wear on Wheels and Brake Shoes



Showing recorder location on one of the 1200 cars of the Connecticut Company

That fact, of course, is so perfectly obvious that it requires no argument.

Another angle of that fact, however, which is not so generally appreciated, is this: **Excessive Use of Brakes Means Excessive Use of Power.**

The only use for a brake is to stop the car. A motorman does this by taking power out that he has previously put in. This to a proper degree is necessary and essential, but you can't

use brakes to an excessive or unnecessary degree unless you have put power into the car to an unnecessary or excessive degree.

## The Arthur Power-Saving Recorder

produces a record of brake use by which motormen may be quickly educated to use their brakes only the proper amount and use their heads more.

The results are not alone saving of power and of wheels and brakeshoes, but also better control of the car and consequently greater safety of operation.

And there are a lot of auxiliary advantages which are all very much worth while.

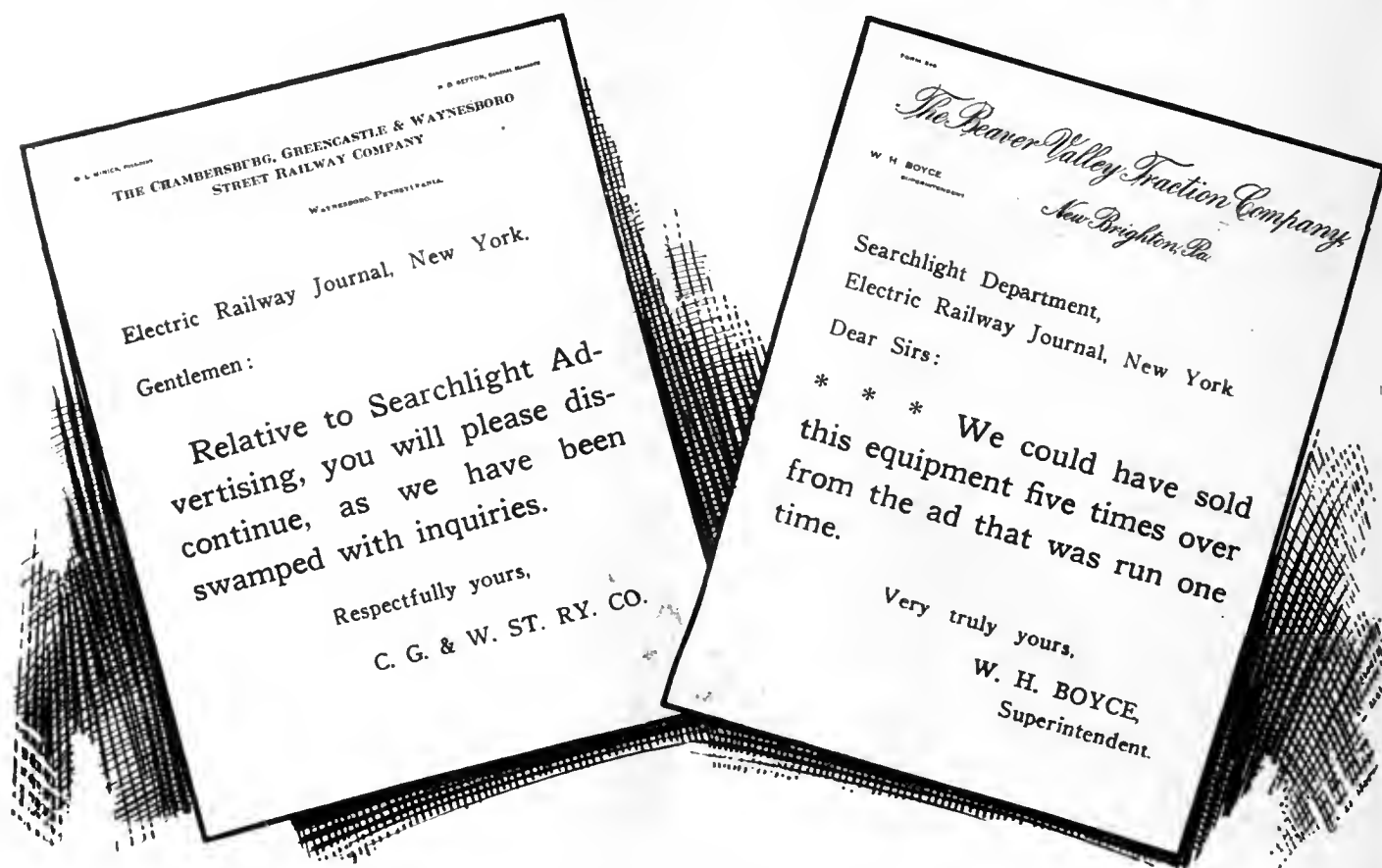
Ask for details.

**The Arthur Power-Saving Recorder Co.**

New Haven, Conn.

*"Power wasted is the true measure of the  
motormen's relative efficiency."*

# Business is Booming!



*Are you  
getting your share?*

Second-hand equipment is commanding a premium. Look over your stock and convert it into cash. Send us the list.

## Searchlight

advertising

will find the anxious buyer for you.

*SEND US YOUR LIST*

Electric Railway Journal, 10th Ave., at 36th St., New York





### Gears and Pinions

Will carry any load you have to deal with, with the maximum of **ECONOMY** and **EFFICIENCY**.

We are specialists in the production of gears for every purpose, and "SPECIAL SPECIALISTS" in railway gears.

Hence we have every confidence in our ability to live up to the above claim.

We have everything that is essential—a new ultra-modern plant (just completed), a corps of workmen second to none in the trade and many years experience.

We want the privilege of quoting on your requirements—big or little.

Do we get it?

**THE VAN DORN & DUTTON CO.**

*Gear Specialists*  
**CLEVELAND, OHIO**  
**U. S. A.**

Write Dep't  
**E R J**  
for  
Gear  
Data

**SALES OFFICES:**  
Seattle, Boston, Chicago,  
Denver, Kansas City,  
Milwaukee, New York,  
St. Louis,  
San Francisco  
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Chattanooga





Columbia Coils Are Made Just Right

## That "Just Right" Feature about Columbia Coils

is not a temporary increase in care and quality to gain your patronage.

It is a feature that has been characteristic of Columbia Coils for a generation.

Columbia Coils must have made good over many years; else

our business would not show unfailing growth year after year.

We are simply determined to give you the best material, the best workmanship and the best price. That principle holds good all along the line—whether in tools or materials.

## Columbia Machine Works & Malleable Iron Co.

### TOOLS

Armature and Axle Straighteners  
Armature shaft straighteners  
Armature buggies and stands  
Babbitting molds  
Banding and heading machines  
Car hoists  
Car replacers  
Coil taping machines for armature leads  
Coil winding machines  
Pinion pullers  
Pit jacks  
Signal or target switches  
Tension stands

Atlantic Ave. and Chestnut St.  
Brooklyn, N. Y.

W. R. Kerschner Co., Inc., N. Y.  
Holden & White, Inc., Chicago  
F. F. Bodler, San Francisco  
Railway & Power Eng. Corp., Ltd., Toronto, Can.



### CAR EQUIPMENT

Armature and Axle Bearings  
Armature and field coils  
Bearings (Axle and Armature)  
Brush-holders and brush-holder springs  
Brake, door and other handles  
Brake forgings, riggings, etc.  
Car trimmings  
Commutators  
Controller handles  
Forgings of all kinds  
Gear cases (steel or malleable iron)  
Grid resistors  
Third-rail shoe beams and accessories  
Trolley poles (steel) and wheels

# CYPRESS

"THE WOOD ETERNAL"

is NOT the *Best Lumber for ALL Railway Purposes*. For certain specific applications, however, in which railways have large lumber requirements, the use of all-heart Cypress develops very large *economies in maintenance costs*. For example, the Railway Signal Association in its standard specifications for wood to be used for "Trunking and Capping" has always placed all-heart Cypress among the first choices in the list of suitable woods.

The Railway Signal Association makes its recommendations as a result of definite *knowledge* of the subject, and its membership includes many able men who are Cypress enthusiasts. We gladly refer all doubters as to Cypress superiority to any well-posted railway engineer who has had experience with Cypress, "the wood eternal."

The same conditions of service which make Cypress superior for "Trunking and Capping" are present in many other railway lumber requirements, such as

# FENCING

and similar purposes where the material is exposed constantly to the weather, and where it is consequently essential that it shall be highly capable of *resistance to decay*. That is the great and particular value of Cypress—it is *highly resistant to decay*. (All-heart especially.)

If railway men in general will study the question of wood durability for other uses as carefully as Railway Signal men have studied it in connection with "Trunking and Capping," there will be a lot more all-heart Cypress used in railway service—to the very great economy of the companies using it.

*Our data is at your service.*

**SOUTHERN CYPRESS MFRS' ASS'N**

1265 Hibernia Bank Building, New Orleans, La., or  
1265 Heard National Bank Building, Jacksonville, Fla.

## It proves your case

The book described here is the official report of a scientific investigation of the 5c. fare conducted by the Massachusetts Institute of Technology. It proves that for the long haul, in ordinary service, 5c. is an insufficient fare. The book is widely quoted, because it is recognized as an impartial authority and because the findings are based on a study of traction systems in all parts of the country.

## Street Railway Fares

by

Dugald C. Jackson  
and David J. McGrath

169 pages, 6 x 9, fully illustrated, price \$2.50 net, postpaid

The data of street railway traffic and fares have been broadly investigated. The factors of street railway traffic which influence the cost of carriage and how these factors affect the practicability of making long hauls for 5c. in ordinary service, are given in full.

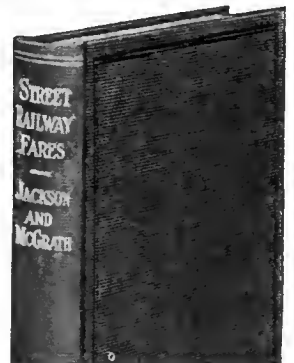
This report is fully illustrated with tables and charts which clearly show the limitations and possibilities existing in the field of electric street railway transportation at the present time.

The research was not limited to the United States alone, but also includes conditions in foreign countries.

The text has been prepared especially for street railway officials, municipal officers and publicists, and we believe these facts contain much of practical value to every street railway man.

**Send no money—  
just the coupon**

Let us send you a copy of the book for ten days' free examination. This will not place you under any obligation, and it will give you an opportunity to see whether or not the book can be of value to you. Simply fill in and mail the coupon.



## FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc.,  
239 West 39th St., New York, N. Y.

You may send me on 10 days' approval:

Jackson and McGrath—Street Railway Fares—\$2.50 net, postpaid.

I agree to pay for the book or return it postpaid within 10 days of receipt.

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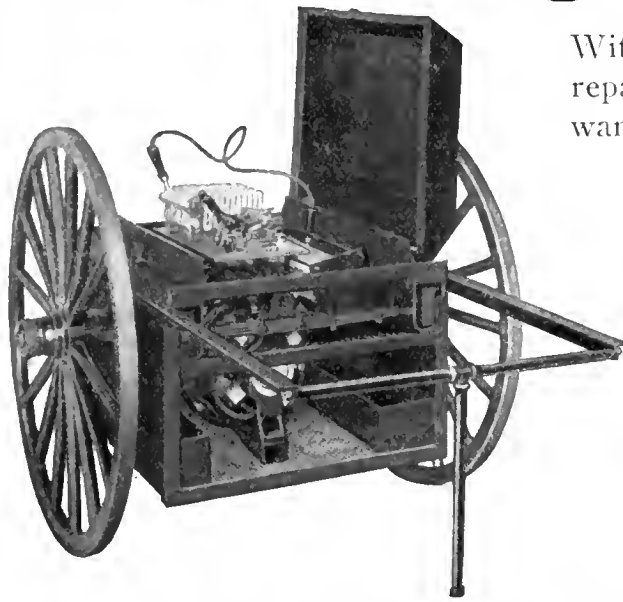
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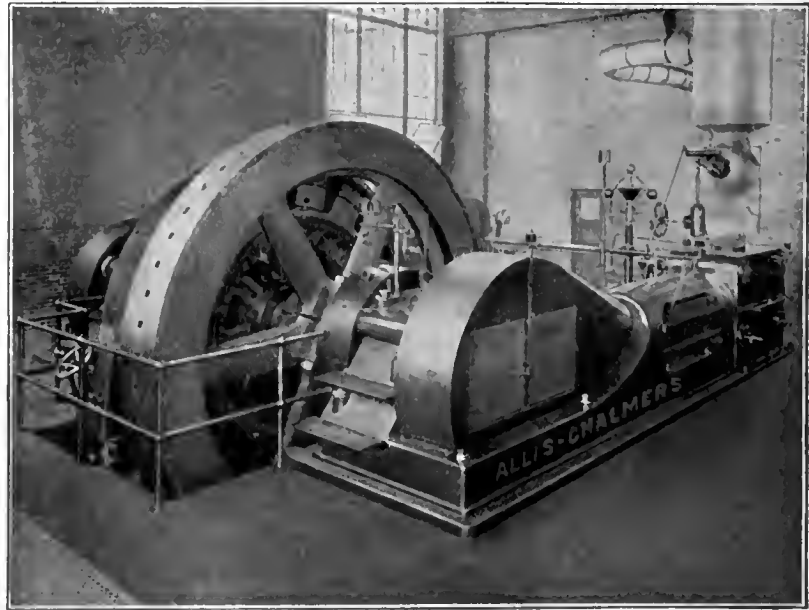
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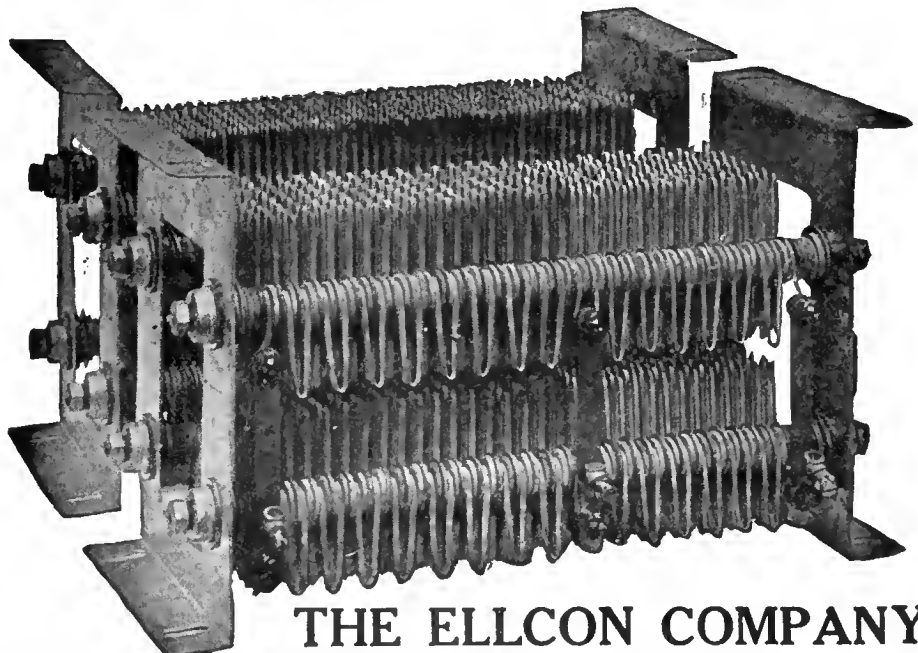
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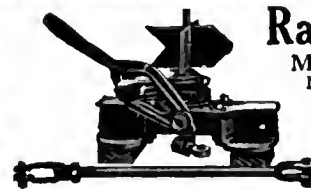
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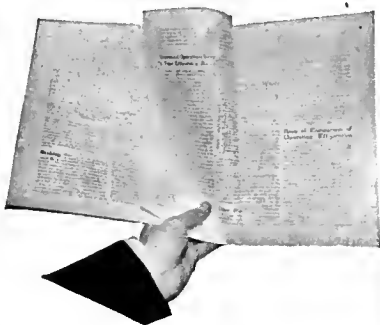
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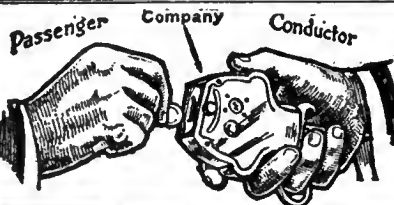
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**ELECTRICAL foreman** wanted; experienced man for overhead line work; must be experienced on arc and high and low tension A.C. and able to lay out new extensions. In reply state experience and salary desired. P-77, Elec. Ry. Journal, Philadelphia.

**ELECTRICAL engineer** wanted; experienced man on overhead and underground A. C. high and low tension distribution systems. State experience and salary desired. P-78, Elec. Ry. Journal, Philadelphia.

**GENERAL foreman or assistant master mechanic** wanted, capable of handling men, by a street railway company in New England, experienced in surface car inspections and repairs. Good salary. Permanent position to right man P-53, Elec. Ry. Journal.

**SUPERINTENDENT** wanted for single track, high speed line. Must be familiar with standard operating methods and transportation details; also a competent executive, capable of handling men and producing results. Give details of experience, references and salary expected. P-76, Elec. Ry. Journal.

**WORKING car barn foreman** wanted by small road to wind armatures, do general repair work on motors and cars, climb a pole and do a little line work in emergencies, one who is willing to work to help at any time and who is willing to take orders from the superintendent. Must be sober and willing to stay permanently. Give particulars and salary wanted in first letter. P-68, Elec. Ry. Journal, Chicago.

## POSITIONS WANTED

**ASSISTANT superintendent or despatcher** of transportation department by man with 22 years' experience in transportation work. Good organizer. PW-74, Elec. Ry. Journal, Chicago.

**AUDITOR and traffic manager** of an exceedingly prosperous small steam railroad desires a similar position with an electric line. PW-67, Elec. Ry. Journal, Chicago.

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## POSITIONS WANTED

**AUDITOR**, thoroughly capable in public utility accounting, solicits change. Sixteen years' experience, age 39, married, references. PW-73, Elec. Ry. Journal, Cleveland.

**ELECTRICAL engineer**. Railway specialist can be engaged for temporary or permanent connection. Reports made for engineering firms or operating systems. Examination of traffic, schedules and car equipment with particular reference to power and other economies. PW-79, Elec. Ry. Journal.

**EXECUTIVE**, now employed, age 39, would consider a change, south preferred. Experience, constructing and operating of electric light and railway transmission, distribution, plants and substations. Ten years in present position giving entire satisfaction. Eighteen years with present employer on other properties. PW-46, Elec. Ry. Journal.

**MASTER car and sign painter** now open for engagement. Experienced in all branches. Best of references. PW-72, Elec. Ry. Journal.

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**SUPERINTENDENT** for city and inter-urban railway seeks field for larger service. Have no desire to change except for greater achievement. At present connected with operators of large interests. Conference or correspondence confidential. PW-66, Elec. Ry. Journal, Chicago.

**TRAFFIC manager, general superintendent or superintendent transportation**. Fifteen years' executive and operating experience. For ten years have specialized in traffic problems. Expert on schedules. Can handle men and show results through economical operation. Forty years old. Will furnish best of references as to energy, ability, character and sobriety. PW-51, Elec. Ry. Journal.

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## BEST REFERENCES

W-75, Elec. Ry. Journal  
10th Ave. at 36th St., New York, N. Y.

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- 1-500 KW. Westinghouse horizontal turbo unit, 3 ph., 60 cy., 360 v., 3600 rpm.
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- 1-500 KW. Westinghouse Horizontal Turbo Generating Unit wound for 3 phase, 60 cy., 2300 volts, speed 3600 rpm., condensing duty.

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- 3-175 KW. Westinghouse single phase transformers, 13,200 volts primary, 390 volts secondary, oil cooled. Switchboard complete.
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current generator.

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Equipment, Apparatus and Supplies Used by the Electric Railway Industry  
with Names of Manufacturers and Distributors

**Advertising, Street Car.**  
Collier, Inc., Barron G.

**Air Cleaners.**  
Herne Mfg. Co.

**Air Rectifiers.**  
Holden & White, Inc.

**Alloys, Steel & Iron.**  
(See also Bearings & Bearing Metals.)  
Titanium Alloy Mfg. Co.

**Anchor, Guy.**  
Electric Service Supplies Co.  
Holden & White, Inc.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

**Anti-Climbers.**  
Railway Improvement Co.

**Automobiles and Buses.**  
Brill Co., The J. G.

**Axle Straighteners.**  
Columbia M. W. & M. I. Co.

**Axles, Car Wheel.**  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Carnegie Steel Co.  
National Railway Appliance Co.  
St. Louis Car Co.  
Standard Steel Works Co.  
Westinghouse Elec. & M. Co.

**Babbitting Devices.**  
Columbia M. W. & M. I. Co.

**Badges and Buttons.**  
Electric Service Supplies Co.  
International Register Co., The

**Batteries, Storage.**  
Electric Storage Battery Co.

**Bearings & Bearing Metals.**  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
General Electric Co.  
St. Louis Car Co.  
Westinghouse Elec. & M. Co.

**Bearings, Center and Roller Side.**  
Baldwin Locomotive Works.  
Holden & White, Inc.

**Bearings, Roller and Ball.**  
Gurney Ball-Bearing Co.

**Bells and Gongs.**  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
St. Louis Car Co.

**Benders, Rail.**  
Niles-Bement-Pond Co.  
Zelnicker Sup. Co., W. A.

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Babcock & Wilcox Co.

**Boiler Cleaning Compounds.**  
Dearborn Chemical Co.

**Boiler Tubes.**  
National Tube Co.

**Bond Testers.**  
American Steel & Wire Co.

**Bonding Apparatus.**  
American Steel & Wire Co.  
Electric Railway Improvement Co.  
Electric Service Supplies Co.  
Ohio Brass Co.

**Bonds, Rail.**  
American Steel & Wire Co.  
Electric Railway Improv. Co.  
Electric Service Supplies Co.  
General Electric Co.  
Lincoln Bonding Co.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

**Book Publishers.**  
McGraw-Hill Book Co., Inc.

**Boring Tools, Car Wheel.**  
Niles-Bement-Pond Co.

**Braces, Rail.**  
Kilby Frog & Switch Co.

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(See also Poles, Ties, Posts, Etc.)  
American Bridge Co.  
Bates Expanded Steel Truss Co.  
Electric Service Supplies Co.  
Hubbard & Co.  
Lindsley Bros. Co.  
Ohio Brass Co.

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Holden & White, Inc.

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Barbour-Stockwell Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
St. Louis Car Co.

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Holden & White, Inc.  
Horne Mfg. Co.  
National Brake Co.  
St. Louis Car Co.  
Westinghouse Trac. B. Co.

**Bridges and Buildings.**  
American Bridge Co.

**Brooms, Track, Steel or Rattan.**  
Zelnicker Supply Co., W. A.

**Brush Holders.**  
Anderson Mfg. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Eureka Co.

**Brushes, Carbon.**  
American Carbon & Battery Wks.  
General Electric Co.  
Jeandron, W. J.  
Morgan Crucible Co.  
United States Graphite Co.  
Westinghouse Elec. & M. Co.

**Brushes, Graphite.**  
Dixon Crucible Co., Jos.  
United States Graphite Co.

**Bunkers, Coal.**  
American Bridge Co.

**Bushings, Case Hardened and Manganese.**  
Bemis Car Truck Co.

**Bushings, Fibre.**  
Diamond State Fibre Co.

**Cables. (See Wires and Cables.)**

**Carbon Brushes. (See Brushes, Carbon.)**

**Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—See those headings.)**

**Car Trimmings. (For Curtains, Registers, Doors, Seats, etc.—See those headings.)**

**Cars, Passenger, Freight, Express, etc.**  
American Car Co.  
Brill Co., The J. G.  
Kuhlman Car Co., G. G.  
St. Louis Car Co.  
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**Cars, Second Hand.**  
Carr Co., C. E. A.  
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Horne Mfg. Co.

**Castings, Gray Iron and Steel.**  
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**Catchers and Retrievers, Trolley.**  
Electric Service Supplies Co.  
Holden & White, Inc.  
Horne Mfg. Co.  
Kerschner Co., Inc., W. R.  
Ohio Brass Co.  
Wood Co., Chas. N.

**Ceiling, Car.—(See Head Lining.)**

**Certified Public Accountant.**  
Swan, James T.

**Circuit Breakers.**  
Automatic Reclosing Circuit Breaker Co.  
General Electric Co.  
Westinghouse Elec. & Mfg. Co.

**Clamps and Connectors for Wires and Cables.**  
Anderson Mfg. Co., A. & J. M.  
Electric Service Supplies Co.  
Frankel Connector Co.  
General Electric Co.  
Hubbard & Co.  
Klein & Sons, Mathias.  
Ohio Brass Co.  
Westinghouse Elec. & Mfg. Co.

**Cleaners and Scrapers, Track.—(See also Snow-Plows, Sweepers and Brooms.)**  
Brill Co., The J. G.  
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Ohio Brass Co.  
Root Spring Scraper Co.  
Van Dorn & Dutton Co.

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General Electric Co.  
Independent Lamp & Wire Co.  
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General Electric Co.  
Westinghouse Elec. & M. Co.

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International Register Co., The

**Commutator Slotters.**  
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General Electric Co.  
Westinghouse Elec. & Mfg. Co.  
Wood Co., Chas. N.

**Commutator Truing Devices.**  
General Electric Co.

**Commutators or Parts.**  
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Columbia M. W. & M. I. Co.  
Eureka Co.  
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Westinghouse Elec. & Mfg. Co.

**Compressors, Air.**  
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General Electric Co.  
Westinghouse Trac. B. Co.

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Westinghouse Elec. & Mfg. Co.

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General Electric Co.  
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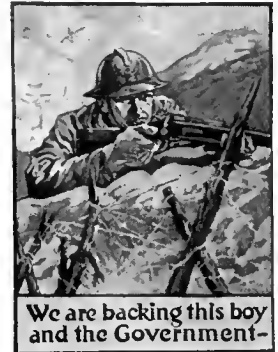
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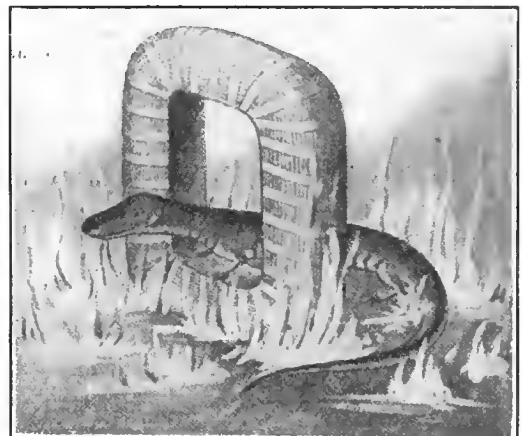
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Van Dorn Coupler Co.  
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**Couplings, Conduit.**

Horne Mfg. Co.

**Cranes. (See also Hoists.)**

Allis-Chalmers Mfg. Co.  
Niles-Bement-Pond Co.  
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Balkwill Manganese Crossing Co.  
International Steel Tie Co.

**Crossing Signals. (See Signals, Crossing.)****Crossings, Track. (See Track, Special Work.)****Crashers, Rock.**

Allis-Chalmers Mfg. Co.

**Culverts.**

Canton Culvert & Silt Co.

**Curtains and Curtain Fixtures.**

Brill Co., The J. G.  
Electric Service Supplies Co.  
Hartshorn Company, Stewart  
St. Louis Car Co.

**Derailing Devices. (See also Track Work.)**

Cleveland Frog & Crossing Co.

**Destination Signs.**

Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.

**Detective Service.**

Wlach Service. P. Edward

**Door Operating Devices.**

Consolidated Car Heating Co.  
National Pneumatic Co.

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Brill Co., The J. G.  
General Electric Co.  
Hale & Kilburn Co.

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National Pneumatic Co.

**Draft Rigging. (See Couplers.)****Drills, Track.**

American Steel & Wire Co.  
Electric Service Supplies Co.  
Niles-Bement-Pond Co.  
Ohio Brass Co.

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Electric Service Supplies Co.  
Zelnicker Sup. Co., W. A.

**Engineers, Consulting, Contracting and Operating.**

Archbold-Brady Co.  
Arnold Co., The.  
Beeler, John A.  
Byllesby & Co., Inc., H. M.  
Clarke, Herbert.  
Drum & Co., A. L.  
Ford, Bacon & Davis.  
Jackson, D. C. & Wm. B.  
Richey, Albert S.  
Sanderson & Porter.  
Scotfield Engineering Co.  
Sloan, Huddle, Feustel & Freeman.  
Stone & Webster.  
White Companies, Tha, J. G.  
Woodmansee & Davidson Engineering Co.

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Allis-Chalmers Mfg. Co.  
Westinghouse Elec. & Mfg. Co.

**Engines, Stemm.**

Allis-Chalmers Mfg. Co.  
Westinghouse Elec. & Mfg. Co.

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Brill Co., The J. G.  
Cleveland Fare Box Co.  
International Register Co., The  
National Railway Appliance Co.

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American Steel & Wire Co.  
Page Steel & Wire Co.

**Fenders and Wheel Guards.**

Brill Co., The J. G.  
Cleveland Fare Box Co.  
Consolidated Car Fender Co.  
Electric Service Supplies Co.  
Root Spring Scraper Co.  
Star Brass Works.

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Diamond State Fibre Co.  
Westinghouse Elec. & Mfg. Co.

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Electric Service Supplies Co.

**Flooring Composition.**

American Mason Safety Tread Co.

**Forgings.**

Eureka Co.  
Standard Steel Works Co.

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Columbia M. W. & M. I. Co.  
D & W Fuse Co.  
General Electric Co.  
Westinghouse Elec. & Mfg. Co.

**Fuses, Refillable.**

Columbia M. W. & M. I. Co.  
General Electric Co.  
Horne Mfg. Co.

**Gaskets.**

Diamond State Fibre Co.  
Power Specialty Co.

**Gas Producers.**

Westinghouse Elec. & Mfg. Co.

**Gates, Car.**

Brill Co., The J. G.

**Gages, Oil and Water.**

Ohio Brass Co.

**Genr Blanks.**

Carnegie Steel Co.  
Diamond State Fibre Co.  
Standard Steel Works Co.

**Gear Cases.**

Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
Westinghouse Elec. & M. Co.

**Gears and Pinions.**

Columbia M. W. & M. I. Co.  
Diamond State Fibre Co.  
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National Railway Appliance Co.  
Nuttall Co., R. D.  
Van Dorn & Dutton Co.

**Generating Sets, Gas-Electric.**

General Electric Co.

**Generators.**

Allis-Chalmers Mfg. Co.  
General Electric Co.  
Lincoln Electric Co.  
Westinghouse Elec. & M. Co.

**Gongs. (See Bells and Gongs.)****Graphite.**

Dixon Crucible Co., Joseph  
Morgan Crucible Co.

**Greases. (See Lubricants.)****Grinders and Grinding Supplies.**

Indianapolis Switch & Frog Co.  
Railway Track-work Co.

**Guards, Cattle.**

American Bridge Co.

**Guards, Trolley.**

Electric Service Supplies Co.  
Ohio Brass Co.

**Harps, Trolley.**

Anderson M. Co., A. & J. M.  
Electric Service Supplies Co.  
Nuttall Co., R. D.  
Star Brass Works.

**Headlights.**

Electric Service Supplies Co.  
General Electric Co.  
Ohio Brass Co.  
St. Louis Car Co.

**Headlining.**

Kerschner Co., Inc., W. B.

**Heaters, Car (Electric.)**

Consolidated Car Heating Co.  
Gold Car Heating & Lighting Co.  
Smith Heater Co., Peter.

**Heaters, Car, Hot Air and Water.**

Cooper Heater Co.  
Smith Heater Co., Peter.

**Heaters, Car (Stove.)**

Electric Service Supplies Co.  
Smith Heater Co., Peter.

**Hoists and Lifts.**

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Duff Mfg. Co.  
Ford Chain Block & Mfg. Co.  
Niles-Bement-Pond Co.  
Van Dorn & Dutton Co.

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Ohio Brass Co.

**Hydraulic Machinery.**

Allis-Chalmers Mfg. Co.  
Niles-Bement-Pond Co.

**Hydrogrounds.**

Horne Mfg. Co.

**Inspection.**

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**Instruments, Measuring, Testing and Recording.**

Economy Electric Devices Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.  
Weston Electric Instrument Co.

**Insulating Cloth, Paper and Tape.**

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General Electric Co.  
Horne Mfg. Co.  
Mitchell-Rand Mfg. Co.  
Sherwin-Williams Co.  
Standard Woven Fabric Co.  
Westinghouse Elec. & M. Co.

**Insulation. (See also Points.)**

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Diamond State Fibre Co.  
Electric Service Supplies Co.  
General Electric Co.  
Holden & White, Inc.  
Horne Mfg. Co.  
Mitchell-Rand Mfg. Co.  
Sherwin-Williams Co.  
Westinghouse Elec. & M. Co.

**Insulators. (See also Line Material.)**

Anderson M. Co., A. & J. M.  
Drew Electric & Mfg. Co.  
Electric Service Supplies Co.  
General Electric Co.  
Horne Mfg. Co.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

**Insulator Pins.**

Electric Service Supplies Co.  
Hubbard & Co.

**Jacks. (See also Crane Hoists and Lifts.)**

Brill Co., The J. G.  
Buckeye Jack Mfg. Co.  
Columbia M. W. & M. I. Co.  
Duff Manufacturing Co.  
National Ry. Appliance Co.

**Joints, Rail.**

Carnegie Steel Co.  
Lackawanna Steel Co.  
Zelnicker Sup. Co., W. A.

**Journal Boxes.**

Bemis Car Truck Co.  
Brill Co., The J. G.

**Laboratory.**

Electrical Testing Lab's.

**Lamp Guards and Fixtures.**

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Electric Service Supplies Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.

**Lamps, Arc and Incandescent. (See also Headlights.)**

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General Electric Co.  
Westinghouse Elec. & M. Co.

**Lamps, Signal and Marker.**

Ohio Brass Co.

**Lathes, Car Wheel.**

Niles-Bement-Pond Co.

**Lighting Regulators, Car.**

Holden & White, Inc.

**Lightning Arrestors.**

Horne Mfg. Co.

**Lightning Protection.**

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Electric Service Supplies Co.  
General Electric Co.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

**Line Material. (See also Brackets, Insulators, Wires, etc.)**

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Columbia M. W. & M. I. Co.  
Diamond State Fibre Co.  
Drew Electric & Mfg. Co.  
Electric Service Supplies Co.  
Eureka Co.  
General Electric Co.  
Holden & White, Inc.  
Hubbard & Co.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

**Locomotives, Electric.**

Baldwin Locomotive Works.  
Brill Co., The J. G.  
General Electric Co.  
McGuire-Cummings Mfg. Co.  
Westinghouse Elec. & M. Co.

**Lubricating Engineers.**

Galena-Signal Oil Co.

**Lubricants, Oil and Grease.**

Dearborn Chemical Co.  
Dixon Crucible Co., Jos.  
Galena-Signal Oil Co.

**Lumber. (See Poles, Ties, etc.)****Machine Tools.**

Columbia M. W. & M. I. Co.  
Niles-Bement-Pond Co.

**Machine Work.**

Columbia M. W. & M. I. Co.  
Holden & White, Inc.  
Horne Mfg. Co.

**Meters, Car, Watt-Hour.**

Economy Electric Devices Co.

**Meters. (See Instruments.)****Mirrors for Motormen.**

Drew Electric & Mfg. Co.

**Motormen's Seats.**

Electric Service Supplies Co.  
Wood Co., Chas. N.

**Motors, Electric.**

Allis-Chalmers Mfg. Co.  
Lincoln Electric Co.  
Westinghouse Elec. & M. Co.

**Water Generation, Bonding and Welding.**

Lincoln Bonding Co.

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#### Oxy-Acetylene. (See Cutting Apparatus, Oxy-Acetylene.)

#### Packing.

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Power Specialty Co.

#### Paints and Varnishes. (Insulating.)

Mitchell-Rand Mfg. Co.  
Sherwin-Williams Co.

#### Paints and Varnishes. (Preservative.)

Dixon Crucible Co., Jos.  
Sherwin-Williams Co.

#### Paints and Varnishes for Woodwork.

National Ry. Appliance Co.  
Sherwin-Williams Co.

#### Paving Material.

Am. Brake Shoe & Fdy. Co.

#### Pickups, Trolley Wire.

Electric Service Supplies Co.  
Ohio Brass Co.

#### Pinion Pullers.

Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
General Electric Co.  
Wood Co., Chas. N.

#### Pinions. (See Gears.)

#### Pins, Case Hardened, Wood and Iron.

Bemis Car Truck Co.  
Electric Service Supplies Co.  
Ohio Brass Co.

#### Pipe.

National Tube Co.

#### Pipe Fittings.

Power Specialty Co.  
Standard Steel Works Co.

#### Planers. (See Machine Tools.)

#### Pliers, Insulated.

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National Railway Appliance Co.

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Hubbard & Co.

#### Pole Sleeves.

Drew Electric & Mfg. Co.

#### Poles and Ties, Treated.

Lindale Bros. Co.

#### Poles, Metal Street.

Bates Expanded Steel Truss Co.  
Hubbard & Co.

#### Poles, Ties, Posts, Piling and Lumber.

Carney & Co., B. J.  
Southern Cypress Mfrs. Assn.  
Western Red Cedar Assn.

#### Poles, Trolley.

Anderson M. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
National Tube Co.  
Nuttall Co., R. D.

#### Poles, Tubular Steel.

National Tube Co.

#### Power Saving Devices.

Arthur Power-Saving Recorder Co.  
Railway Improvement Co.

#### Pressure Regulators.

General Electric Co.  
Ohio Brass Co.

#### Pumps.

Allis-Chalmers Mfg. Co.

#### Punches, Ticket.

Bonney-Vehelage Tool Co.  
Horne Mfg. Co.  
International Register Co., The  
Wood Co., Chas. N.

## WHAT AND WHERE TO BUY

#### Purifiers, Feed Water

Scaife & Sons Co., Wm. B.

#### Rail Grinders. (See Grinders.)

#### Rail Welding. (See Brazing and Welding Processes.)

#### Rails, Relaying.

Zelnicker Supply Co., W. A.

#### Rattan.

Brill Co., The J. G.  
Electric Service Supplies Co.  
Hale & Kilburn Co.  
St. Louis Car Co.

#### Recorders, Power Saving.

Arthur Power-Saving Recorder Co.

#### Registers and Fittings.

Bonham Recorder Co.  
Brill Co., The J. G.  
Electric Service Supplies Co.  
International Register Co., The  
Rooke Automatic Register Co.

#### Reinforcement, Concrete.

American Steel & Wire Co.

#### Repair Shop Appliances (See also Coil Banding and Winding Machines.)

Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.

#### Repair Work. (See also Coils.)

Cleveland Armature Works.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Independent Lamp & Wire Co.  
Westinghouse Elec. & M. Co.

#### Replacers, Car.

Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.

#### Resistance, Grid.

Columbia M. W. & M. I. Co.  
Ellecon Co.

#### Resistance, Wire and Tube.

General Electric Co.  
Westinghouse Elec. & M. Co.

#### Retrievers, Trolley. (See Catchers and Retrievers, Trolley.)

#### Rheostats.

Ellecon Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.

#### Sanders, Track.

Brill Co., The J. G.  
Cleveland Fare Box Co.  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
Horne Mfg. Co.  
Holden & White, Inc.  
McGuire-Cummings Mfg. Co.  
Ohio Brass Co.  
St. Louis Car Co.

#### Sash Fixtures, Car.

Brill Co., The J. G.

#### Sash Metal, Car Window.

Hale & Kilburn Co.

#### Scales, Weights, Balances and Dynamometers.

Horne Mfg. Co.

#### Scrapers, Track. (See Cleaners and Scrapers, Track.)

#### Seats, Car.

Brill Co., The J. G.  
Hale & Kilburn Co.  
St. Louis Car Co.

#### Second-Hand Equipment. (See also pages 44, 45.)

Archer & Baldwin.  
MacGovern & Co., Inc.

#### Shade Rollers.

Hartshorn Co., Stewart.

#### Shades, Vestibule.

Brill Co., The J. G.  
Electric Service Supplies Co.

#### Shovels.

Hubbard & Co.

#### Shovels, Power.

Allis-Chalmers Mfg. Co.

#### Signal Systems, Block.

Electric Service Supplies Co.  
Federal Signal Co.  
Nachod Signal Co., Inc.  
Wood Co., Chas. N.

#### Signals, Car Starting.

Consolidated Car Heating Co.  
National Pneumatic Co.

#### Signal Systems, Highway Crossing.

Nachod Signal Co., Inc.

#### Slack Adjusters. (See Brake Adjusters.)

#### Sleet Wheels and Cutters.

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Bonney-Vehelage Tool Co.  
Columbia M. W. & M. I. Co.  
Drew Electric & Mfg. Co.  
Holden & White, Inc.  
Nuttall Co., R. D.

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Columbia M. W. & M. I. Co.  
Consolidated Car Fender Co.

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Sherwin-Williams Co.

#### Soldering and Brazing Apparatus. (See Welding, Processes and Apparatus.)

#### Spikes.

American Steel & Wire Co.

#### Splicing Compounds.

Standard Woven Fabric Co.  
Westinghouse Elec. & Mfg. Co.

#### Splicing Sleeves. (See Clamps and Connectors.)

#### Springs, Car & Truck.

American Steel Foundries.  
American Steel & Wire Co.  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Standard Steel Works Co.  
Union Spring & Mfg. Co.

#### Sprinklers, Track & Road.

Brill Co., The J. G.  
St. Louis Car Co.

#### Steps, Car.

American Mason S. T. Co.  
Universal Safety Tread Co.

#### Stokers, Mechanical.

Babcock & Wilcox Co.  
Green Eng'g. Co.  
Murphy Iron Works.  
Westinghouse Elec. & M. Co.

#### Storage Batteries. (See Batteries, Storage.)

#### Straps, Car, Sanitary.

Holden & White, Inc.  
Railway Improvement Co.

#### Structural Iron. (See Bridges.)

#### Superheaters.

Babcock & Wilcox Co.  
Power Specialty Co.

#### Sweepers, Snow. (See Snow Plows, Sweepers & Brooms.)

#### Switch Stands.

Kilby Frog & Switch Co.  
Ramapo Iron Works.

#### Switches, Track. (See Track, Special Work.)

#### Switches & Switchboards.

Allis-Chalmers Mfg. Co.  
Anderson Mfg. Co., A. & J. M.  
Electric Service Supplies Co.  
General Electric Co.  
Indianapolis Switch & Frog Co.  
Westinghouse Elec. & M. Co.

#### Tampers, Tie.

Ingersoll-Rand Co.

#### Tapes and Cloths. (See Insulating Cloths, Paper and Tape.)

#### Telephones and Parts.

Electric Service Supplies Co.

#### Testing Clips.

Frankel Connector Co.

#### Testing, Commercial & Electrical.

Elec'l Testing Laboratories.  
Hunt & Co., Robert W.

#### Testing Instruments. (See Instruments, Electrical Measuring, Testing, etc.)

#### Thermostats.

Consolidated Car Heating Co.  
Gold Car Heating & Lighting Co.  
Railway Utility Co.  
Smith Heater Co., Peter.

#### Ticket Choppers & Destroyers.

Electric Service Supplies Co.

#### Ties, Mechanical.

Dayton Mechanical Tie Co.

#### Ties and Tie Rods, Steel.

American Bridge Co.  
Barbour-Stockwell Co.  
Carnegie Steel Co.  
International Steel Tie Co.

#### Ties, Wood Cross. (See Poles, Ties, Posts, etc.)

#### Tools, Track & Miscellaneous.

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Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
Hubbard & Co.  
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Railway Track-work Co.

#### Torches, Acetylene. (See Cutting Apparatus.)

#### Towers & Transmission Structures.

American Bridge Co.  
Archbold-Brady Co.  
Bates Exp. Steel Truss Co.  
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McCardell & Co., J. R.

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Barbour-Stockwell Co.  
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Columbia M. W. & M. I. Co.  
Indianapolis Switch & Frog Co.  
Kilby Frog & Switch Co.  
New York Switch & Crossing Co.  
Ramapo Iron Works.

#### Transfers. (See Tickets.)

#### Transfer Tables.

American Bridge Co.  
Archbold-Brady Co.

#### Transformers.

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General Electric Co.  
Westinghouse Elec. & M. Co.

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Universal Safety Tread Co.

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Electric Service Supplies Co.  
General Electric Co.  
Holden & White, Inc.



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**Trolleys & Trolley Systems.**  
Ford Chain Block & Mfg. Co.

**Trolley Shoes.**  
Holden & White, Inc.

**Trolley Wheels. (See Wheels, Trolley.)**

**Trucks, Car.**  
American Steel Foundries.  
Baldwin Locomotive Works.  
Bemis Car Truck Co.  
Brill Co., The J. G.  
St. Louis Car Co.

**Tubing, Steel.**  
National Tube Co.

**Turbines, Steam.**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.

**Turbines, Water.**  
Allis-Chalmers Mfg. Co.

**Turnstiles.**  
Perey Mfg. Co., Inc.

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Allis-Chalmers Mfg. Co.

**Valves.**  
Ohio Brass Co.

**Varnishes. (See Paints, etc.)**

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Brill Co., The J. G.  
Holden & White, Inc.  
National Railway Appliance Co.  
Railway Utility Co.  
St. Louis Car Co.

**Voltmeters. (See Instruments.)**

**Washers.**  
Diamond State Fibre Co.

**Water Softening and Purifying Systems.**  
Scaife & Sons Co., Wm. B.

**Welders, Electric Arc.**  
Lincoln Electric Co.

**Welders, Portable Electric.**  
Electric Railway Improvement Co.  
Indianapolis Switch & Frog Co.

**Welding Processes and Apparatus.**  
Electric Railway Improvement Co.  
General Electric Co.  
Lincoln Electric Co.  
National Rly. Appliance Co.  
Westinghouse Elec. & M. Co.

**Wheel Guards. (See Fenders & Wheel Guards.)**

**Wheel Presses. (See Machine Tools.)**

**Wheels, Car, Cast Iron.**  
Bemis Car Truck Co.

**Wheels, Car, Steel and Steel Tired.**  
American Steel Foundries.  
Bemis Car Truck Co.  
Carnegie Steel Co.  
Standard Steel Works Co.

**Wheels, Trolley.**

Anderson Mfg. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
Eureka Co.  
General Electric Co.  
Holden & White, Inc.  
Nuttall Co., R. D.  
Star Brass Works.

**Whistles, Air.**  
General Electric Co.  
Ohio Brass Co.

**Wire Rope.**  
American Steel & Wire Co.  
Roebbing's Sons Co., John A.

**Wires and Cables.**  
Aluminaum Co. of America.  
American Steel & Wire Co.  
Bridgeport Brass Co.  
D & W Fuse Co.  
General Electric Co.  
Kerite Insulated Wire & Cable Co.  
Roebbing's Sons Co., John A.  
Westinghouse Elec. & M. Co.

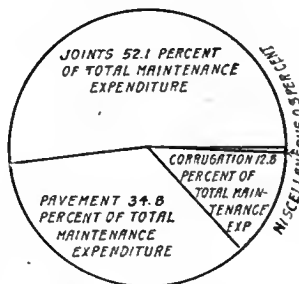
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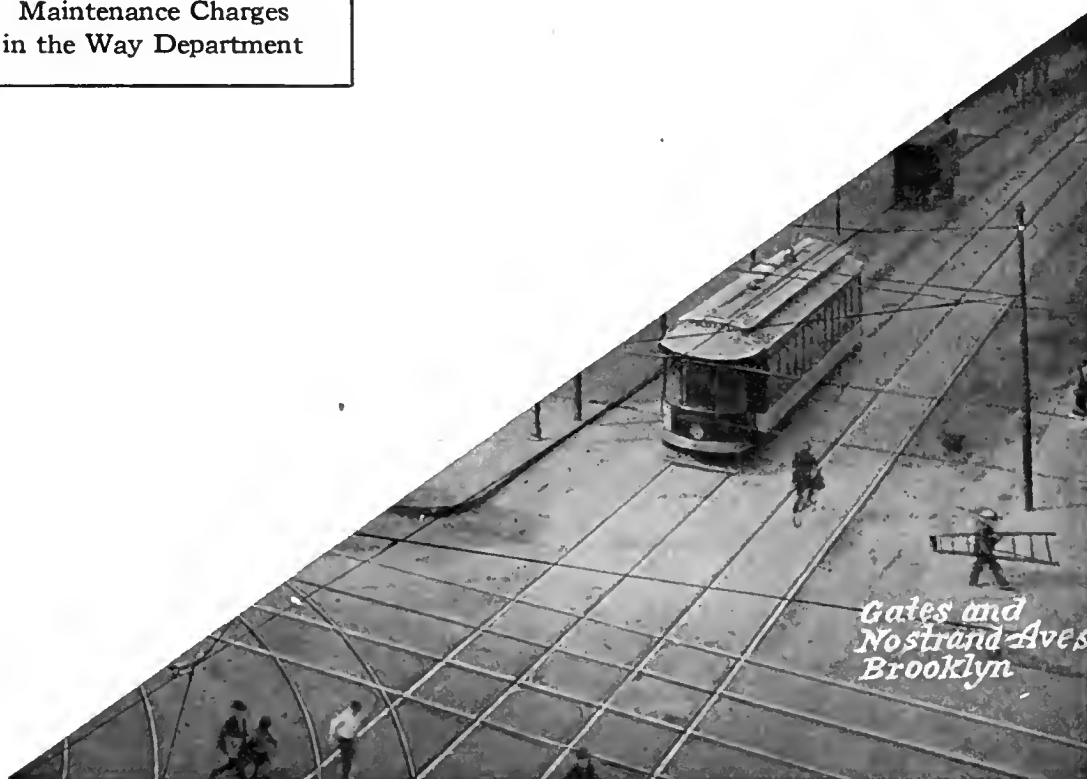
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A Typical Graphical  
Representation  
of Assignment of



Maintenance Charges  
in the Way Department

# Specify Titanium-Treated Rail for Less Car Maintenance



Many a dollar that goes into wheel, truck and car body maintenance could be saved by investing only a fraction of that expense in better track construction and in better rails.

For example, how trifling is the \$2 per ton for Titanium Treatment of rails in comparison with the single item of broken wheel flanges on rail which is badly worn ahead of its time.

Titanium-Treated Rail has a direct and beneficial influence on the life of car equipment.

## TITANIUM ALLOY MANUFACTURING COMPANY

NIAGARA FALLS, N. Y.

New York Office: 165 Broadway





## There's Relief in Gurney Ball Bearings

The relief lies in utilizing to the utmost all the heat there is in the coal you have—which is another way of saying, don't waste it in bearing-friction. Gurney Ball Bearings eliminate most of this loss and result in greatly increased power saving.

In addition, they cut the cost of labor and oil, often running for six months or a year without lubrication and they've greater load capacity than other ball bearings of equal size.

"Put it up to our Engineers."

**Gurney Ball Bearing Co.**

CONRAD PATENT LICENSEE

Chicago, Ill. Jamestown, N. Y. New York, N. Y.

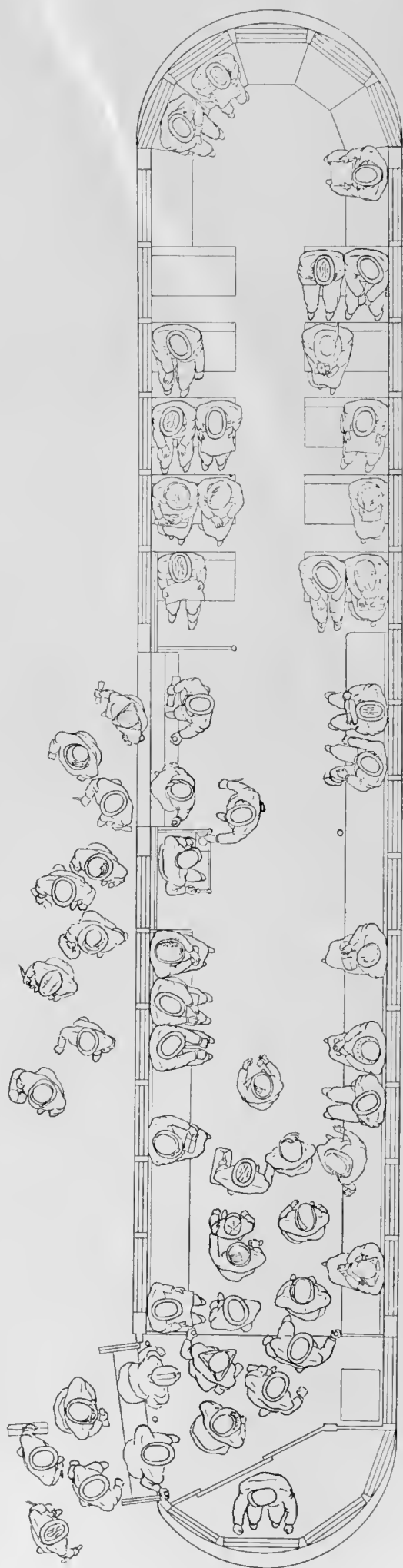
# GURNEY

America into full ac-  
heralded last year.  
two day, or less than  
necessary to fill the normal require-  
ments for twenty-four hours. The re-  
sult was that the increasing shortage  
that has been making it felt since  
that has been making it felt since

# *The Peter Witt Front-Entrance Center-Exit Car*

Since the Peter Witt Car doubled the terminal capacity at the Public Square in Cleveland (the central terminal and transfer point of most of the city railway lines), and practically cut in half the time of stops at heavy transfer points on crosstown lines, the railway field has discovered itself possessed of a new and highly desirable type for overcoming the intolerable traffic congestion that has developed in so many cities of late years. The nearby cities of Toledo, Youngstown, Erie, Buffalo, Syracuse and Utica, naturally were the first discoverers of the wonderful success of the car in their sister city and the first to share in the benefits. The simple and logical plan of using the front half of the car for a loading platform and putting the conductor and farebox just forward of the center exit for the easy and certain method of fare collection, gives an astonishing freedom and celerity to the movement of passengers in and out. There is no conflicting movement and the seating arrangement, wide aisles and doors, impel passengers to do the right thing and do it quickly—no requesting, exhorting, commanding on the part of the motorman and conductor to “Step lively” and “Step to the rear.”

THE J. G. BRILL COMPANY, PHILADELPHIA, PA.  
AMERICAN CAR COMPANY, ST. LOUIS, MO.  
G. C. KUHLMAN CAR CO., CLEVELAND, OHIO.  
WASON MANFG. CO., SPRINGFIELD, MASS.





# The G-E 258 Motor in Wilmington

By using the G-E 258 motor with twenty-six inch diameter wheels, the Wilmington & Philadelphia Traction Company has been able to dispense with one of the usual two steps between paving and platform, thereby reducing the time for loading and unloading.

The successful operation of the original 31-GE-258 ball bearing equipment under the severe grade and service conditions in Wilmington is best demonstrated by the fact that fifteen duplicate equipments have been ordered.

The GE-258 ball-bearing, self-ventilated motor is a recognized standard for the modern low-floor city car.



## General Electric Company

General Offices:



Sales Offices

Fuel and Labor Saving Issue

# ELECTRIC RAILWAY JOURNAL

New York, March 16, 1918

McGraw-Hill Company, Inc.

Vol. 51, No. 11. 10c a Copy

Annual Maintenance Number  
Special Mechanical and Engineering Edition



Samson Bell and Register Cord—Samson Spot Trolley Cord. Both are the same extra quality.

Both should be on your cars if you are studying economy and low maintenance.

**Samson Cordage Works**

Boston, Mass.

# SAMSON CORD

# Electric Freight Haulage Saves The Day

## ELECTRIC LINE SAVED TOWNS IN STORMY WEATHER

Chicago, North Shore and Milwaukee Railroad Carried Coal and Bread to Naval Station.

### CREWS FACE BLIZZARD

Despite the Snow-Covered Tracks Crew Drove Cars to Destination.

Continuous operation of the Chicago, North Shore & Milwaukee railroad during the recent storm saved a number of the towns along the line from serious inconvenience, if not from actual suffering. Not only did the electric line take care of the passenger business when the steam roads were tied up, but it hauled meat, milk and coal to a number of north shore towns which otherwise might have experienced a real famine.

Now that traffic is nearing a normal condition some of the things performed by the north shore line, in the face of almost insurmountable difficulties, are coming to light. Many of the employees worked in the blinding drifts as long as forty-eight hours without sleep and with the utmost cheerfulness, realizing that if they gave up the communities which they serve would suffer.

#### Coaled Naval Station.

The day before the first storm broke in all its fury the electric line delivered 90 cars of coal to the Great Lakes naval training station. But for the timely assistance of the electric line the great training camp with its 20,000 jackies would have suffered for lack of fuel.

From the Borden Condensed Milk

company at Evanston the electric line received two carloads of milk, which were distributed in the towns along the line, thus averting a serious milk famine. Mrs. Scott Durand, owner of the famous Crabtree dairy, found the electric line a savior in the time of stress. The steam roads could not help, but the electric line took care of all her milk shipments and did so in such a satisfactory manner that she will continue to use it hereafter.

#### Carried Bread to Station.

When the naval station was threatened with a bread shortage in the midst of the storm an electric train crew, under tremendous difficulties, pulled a carload of bread from Libertyville to Great Lakes. It was not exactly a 'pleasure trip' for that train crew, but they determined to make a record for the road. They pushed through and delivered the goods. Not only that but when they were tired out by the almost superhuman efforts they made to keep traffic open, and when the men in charge asked them to tie up their train at Libertyville and sleep in the cars for a few hours, they refused to take the needed rest but continued their relief work, taking care of the usual steam road traffic at Rondout.

So successful was the electric road in getting meat cars through and averting a meat shortage in a number of towns that Armour & Co. has taken advantage of the facilities and shipped several more carloads of meat from its Evanston branch to supply all north shore towns along the electric line.

#### Proved Superiority.

In other ways the electric line proved its superiority over the steam roads during the storm. Several carloads of motor trucks were hauled from Kenosha to Milwaukee through the snowdrifts, when the steam roads could not handle them. The service was given cheerfully and promptly and shippers have realized as never before that they have transportation facilities at their doors which can be relied upon in any emergency.

The service given by the north shore electric under trying circumstances will not soon be forgotten by the residents along the north shore district. The road has made many new friends, who have found that under its present management it is really the "road of service."

Read this clipping from the January 19th, 1918, issue of the Evansville News Index, it tells its own story.

Is your system prepared to render similar service?

Moving Freight is a profitable business for most every electric road.

Address either company

**The Baldwin  
Locomotive Works  
Philadelphia, Pa.**

**Westinghouse  
Electric & Mfg. Co.  
East Pittsburgh, Pa.**

# Electric Railway Journal

H. W. BLAKE, Editor

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# Westinghouse

## Heat-Proof Cap and Cone Suspension



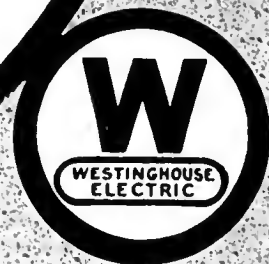
Does Not Soften  
at Any Temperature  
Is Stronger Than the Metal Body

It Will Reduce Your  
Line Maintenance

Test Voltage 10,000

Apply to our nearest office for samples

Westinghouse Electric & Manufacturing Co.  
East Pittsburgh, Pa.





# Westinghouse

## MP Lightning Arresters

For All Voltages  
up to 750 Volt  
Direct or Alter-  
nating Current

For Railway  
Lines and  
Cars

One or  
two MP Ar-  
resters mounted on  
each car give ample  
protection under ordi-  
nary conditions.

Auxiliary  
protection  
should be provided  
by mounting MP Ar-  
resters on the line, about  
five to the mile.

The line arresters relieve the car arresters from excessive duty by discharging from the line, so that complete protection is more nearly assured to the apparatus on the car.

MP Arresters have the lowest equivalent gap, and the maximum discharge capacity of any arrester for similar service, except the condenser and electrolytic types.

Leaflets Nos. 3872 and  
3917 give instructions  
for the installation and  
care of lightning ar-  
resters on railway lines  
and cars.



For Conduit Wiring



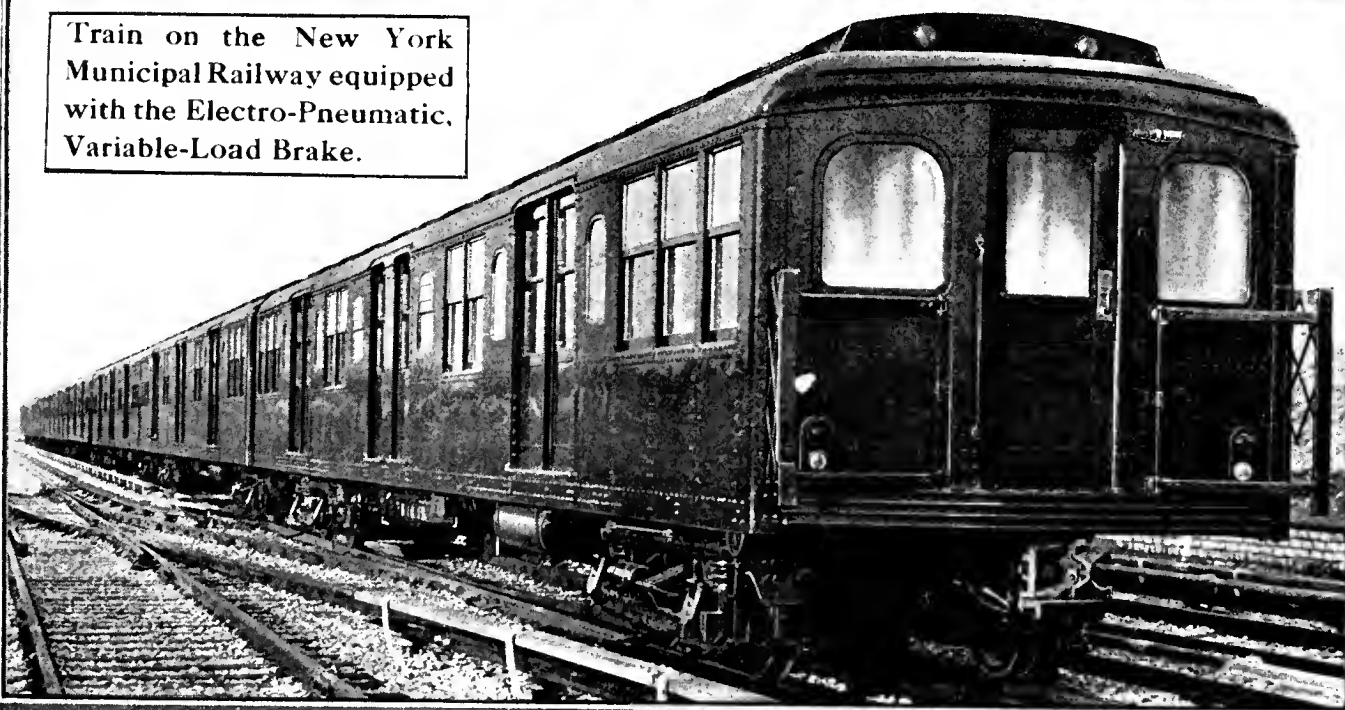
For Car  
Mounting

Westinghouse Electric & Manufacturing Co.  
East Pittsburgh, Pa.

Sales Offices in All Large American Cities

# The Electro-Pneumatic Variable-Load Brake

Train on the New York  
Municipal Railway equipped  
with the Electro-Pneumatic,  
Variable-Load Brake.



—automatically adjusts the braking power on the car to suit the load carried varying from minimum on an empty car to maximum when the car is fully loaded. The entrance of passengers to the car actuates the

adjusting mechanism and automatically increases the braking power. Similarly, the exit of passengers reduces the braking power. Hence a brake combining efficiency and safety in an unusual degree.

*Brake Building our Business for a Lifetime*

## Westinghouse Traction Brake Co.

General Offices and Works, Wilmerding, Pa.

Atlanta, Ga.  
Boston, Mass.  
Chicago, Ill.  
Columbus, O.

Denver, Col.  
Houston, Tex.  
Los Angeles



Mexico City  
New York, N. Y.  
Pittsburgh, Pa.

San Francisco  
Seattle, Wash.  
St. Louis, Mo.  
St. Paul, Minn.

## Tinkle, Tinkle, Little Car

Tinkle, tinkle, little car—if indeed that's what you are—running on the Summit line—how I wish that you were mine. I would put you in my flat as a playroom for our cat, so he couldn't catch our bird. You may think it sounds absurd; but when first the thing I spied, "Holy Smokes!" I wildly cried, "someone's child has strayed afar on his little kiddie kar."

When at length it came along, I decided I was wrong; thought it was the private bus of some plutocratic cuss, who prefers to ride alone with a street car all his own—or perhaps a circus van. Then it was the little man, seated on a stool in front, did a great magician stunt; pulled a throttle open wide, then a casement by his side folded up like some dropped and upon it people hopped, down a tiny platform their hands. Then I saw a sight: My land!

Some had dollars, some had dimes. He makes change a dozen times, answers questions with a smile, hollers "Step up in the aisle"; pulls a lever here and there, regulating brakes and air. When he is prepared to go, shuts the bird-cage with his toe, moves a gadget with his knee—regulates the speed, you see—pulls the bell cord with his teeth, lest some folks get caught beneath. That would throw 'er off the track; maybe flop 'er on 'er back. Calls out names of every street, punches transfer with his feet. Thus he earns his daily pay, running cars out Summit Way. Worth a jitney, yea, and more, just to see him fold that door.—Seattle Post-Intelligencer.

# The POET

even  
saw the  
advantages  
of  
the

# Safety Devices on One-Man Cars

Poets are notoriously impractical. They walk with their heads up in the air—and stub their toes against the curb-stone.

But—the Safety Car, with its complete equipment of labor- and time-saving devices captured his roving poetical eye and held it!

The practical railroad man hardly needs poetry to impress him with the advantages of our devices—he knows!

If you don't—better ask us for our bulletins on the Safety Car.



## SAFETY CAR DEVICES CO.

Main Office—Boatmen's Bank Bldg., ST. LOUIS, MO.

CHICAGO  
Railway Exchange Bldg.

NEW YORK  
City Invest. Building

PITTSBURGH  
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**Strong and Sturdy  
After  
16 Years' Service**

**Northern  
White Cedar  
Poles**

**Good for  
Many Years  
More**

This shows lines of the Terre Haute, Indianapolis & Eastern Traction Co., Eastern Division; built of NORTHERN WHITE CEDAR POLES.

These NORTHERN WHITE CEDAR POLES were set 16 years ago, have steadily carried good loads, and are good for years more of service.

Examinations made recently of NORTHERN WHITE CEDAR POLE lines located in different sections of the country furnish plenty of proof of the long life of these poles. These examinations show that poles set from 15 to 20 years ago are in good condition—capable of years more of good service.

NORTHERN WHITE CEDAR POLES offer great resistance to decay. They contain a large percentage of heartwood, which adds strength. Low first cost and low cost per-mile-per-year. Light in weight. Easily transported and erected. Non-conductors and safe to work on.

NORTHERN WHITE CEDAR POLES are extensively used in large population centers where poles must carry heavy loads and at the same time be attractive in appearance. You are not dealing with theory and guess when you consider these poles. You have the record of years of service to guide you.

*"The Sturdy, Attractive Line"*

**Northern White Cedar Association**

**Lumber Exchange**

**Minneapolis, Minn.**





# PRODUCTS



O-B Extruded Trolley Ear—Patented  
(Runner piece is extruded metal to which is securely attached a malleable iron boss)

## O-B Extruded Ears Fit the Wire

O-B Extruded Ears are as accurate in cross-section as the trolley wire itself.

Extruded metal is squeezed through a die under tremendous pressure during manufacture—and it is therefore absolutely uniform in dimensions and smooth surfaced.

The result in service is a perfectly tight fit on the wire which means a lasting support for the trolley wire and a smooth underrun for the wheel.



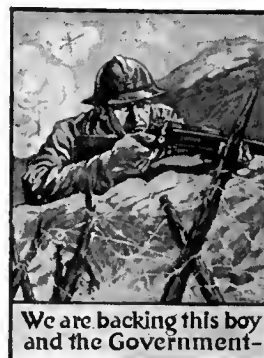
On Round Wire  
Generous quantity  
of metal in lips



On Grooved Wire  
Perfect clearance  
for trolley wheel



On Figure 8 Wire  
Perfect clearance  
for trolley wheel



We are backing this boy  
and the Government—

O-B Extruded Ears demonstrate their superiority in actual service. Try them on your own line.

*O-B Engineers have an invaluable fund of knowledge gained through practical experience on scores of properties. Their cooperation is yours in the solution of any problem concerning overhead construction.*

### The Ohio Brass Company, Mansfield, Ohio

New York Philadelphia Pittsburgh Chicago Los Angeles San Francisco



# Phono-Electric

## —The Wire of Long Life



Measured 0.475 in. in 1908, 0.4614 in. in 1916

That's the **maximum** wear after eight years of 60 miles an hour pantograph service on the Denver & Interurban Railway with Phono-Electric Trolley Wire.

Do you believe that a **copper** wire of 0000 section, could have served thirty-two to forty-five trains a day without having been distorted, worn, burnt or broken in many places?

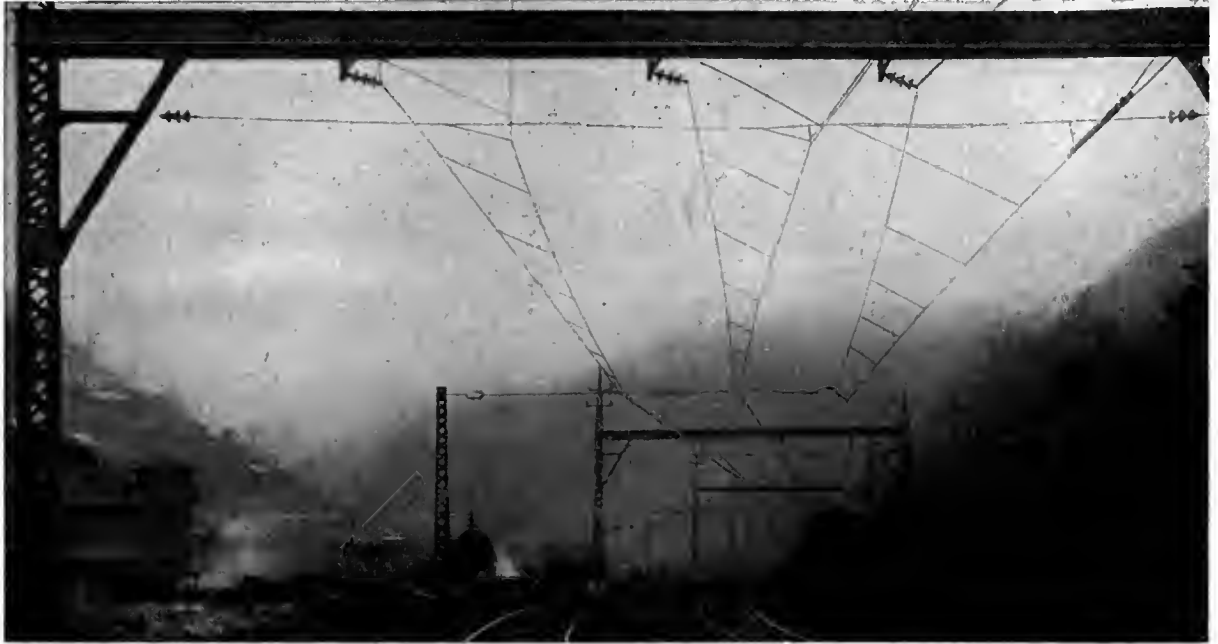
Of course it couldn't! When the builders of this great high-tension road (11,000 volts) wanted a trolley wire that would stay up in all stress of wind and weather they selected Phono-Electric.

Do it, too.

**Bridgeport Brass Company**  
**Bridgeport** **Connecticut**

# Phono-Electric

—the one choice for curves



The collection of current at 11,000 volts for a trailing load of 3250 tons at 14 miles an hour up a 3 per cent grade is no child's play at any time.

On curves it is a real problem, because of the canted position of the contact wire and the extra side play of the pantographs.

Under such conditions steel wire rapidly "arcs" out while copper rapidly wears out.

The choice of Phono-Electric for such a situation is based upon its dominant qualities of toughness and homogeneity, also the degree of ductility which permits it to be lined up on curves and to take excessive pounding without crystallization.

**Bridgeport Brass Company**  
**Bridgeport** **Connecticut**

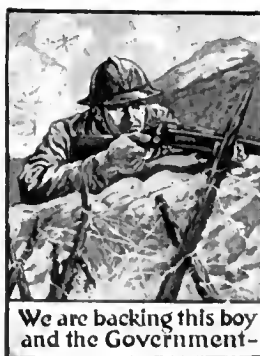


# The Worst Winter in Further proved the worth of

Temperature drops of 40 degrees in 20 hours took place along the Middle Atlantic Coast; drops of 65 degrees in 48 hours in some of the Central States. Railroad tracks and railroad line installations were among the worst sufferers. The rapid changes from 20° below zero to 30° and 40° above, caused

strains in pavements and track construction which were far in excess of anything experienced in the past.

And it is of the utmost interest to railroad companies to know that **International Steel Twin Ties** withstood even these severe attacks without breaking, buckling and spreading.



We are backing this boy  
and the Government-

## The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations  
General Sales Office and Works: Cleveland, Ohio

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Los Angeles, Cal.

San Francisco, Cal  
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R. I. Coover Co.,  
Salt Lake City, Utah.

J. E. Lewis & Co.,  
Dallas, Texas.

Maurice Joy,  
Philadelphia

William H. Ziegler,  
Minneapolis, Minn



# United States History International Steel Twin Ties

December, 1917, and January, 1918, have taught many of the electric railways a much needed lesson.

They have shown that wooden ties, ordinary single steel ties and other "old-fashioned" track constructions, are not equal to the severe joint demands of extreme temperature changes and high-speed heavy traffic.

They have clearly demonstrated that one way and the only safe way to dodge track

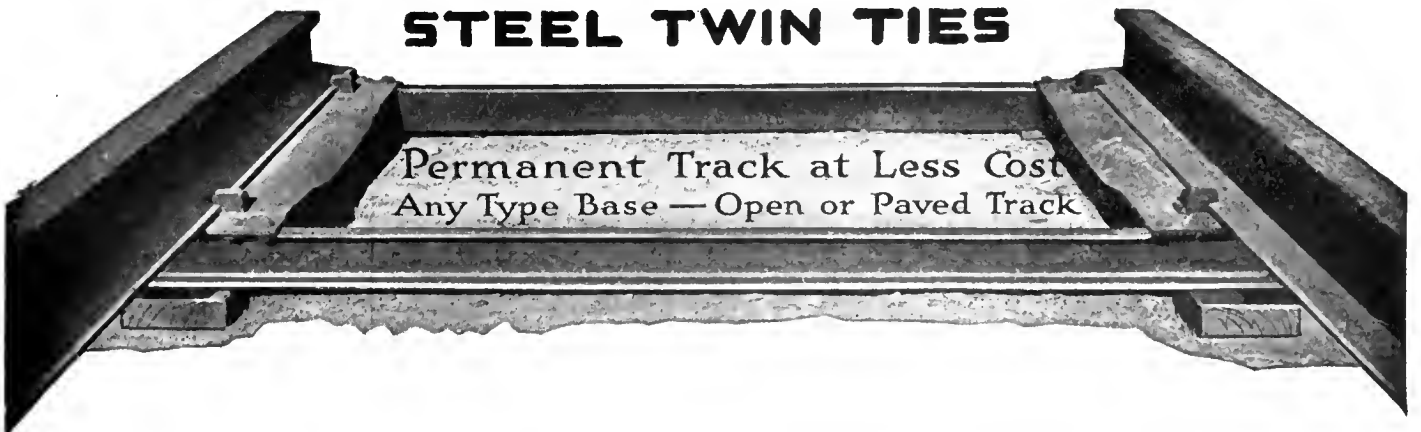
troubles is to use **International Steel Twin Ties**.

For there is no guarantee, and no promise that the severe weather of the past three months may not be repeated eight months hence, and that your tracks will not be subjected to another even severer test next year.

Don't you think it would be well to **prepare** in time against a repetition of the 1917-1918 nightmare by selecting

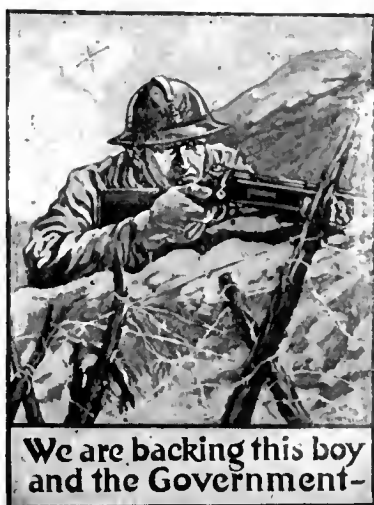
## **INTERNATIONAL STEEL TWIN TIES**

**Permanent Track at Less Cost  
Any Type Base — Open or Paved Track**





*Keystone Sand Drier*



# *Sand Drying With These*

## *Keystone Sand Driers*

It consists simply of a cast-iron heater surrounded by a sheet-iron hopper, which rests on a perforated ring. Wet sand is shoveled into the hopper against the heater, and as it dries runs out through the perforated ring at the bottom.

It dries the sand quickly and cheaply; uses no steam coils; is made to burn any kind of fuel; may be located and operated anywhere; it is **the** solution for your sand-drying problems.

Let us send you our booklet and give you quotations.

*Write for Catalogs*

## **ELECTRIC SERVICE SUPPLIES CO.**

*Manufacturer of Railway Material and Electrical Supplies*

PHILADELPHIA  
17th and Cambria Sts.

NEW YORK  
50 Church St.

CHICAGO  
Monadnock Bldg.

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg



# *and Armature Repairs*

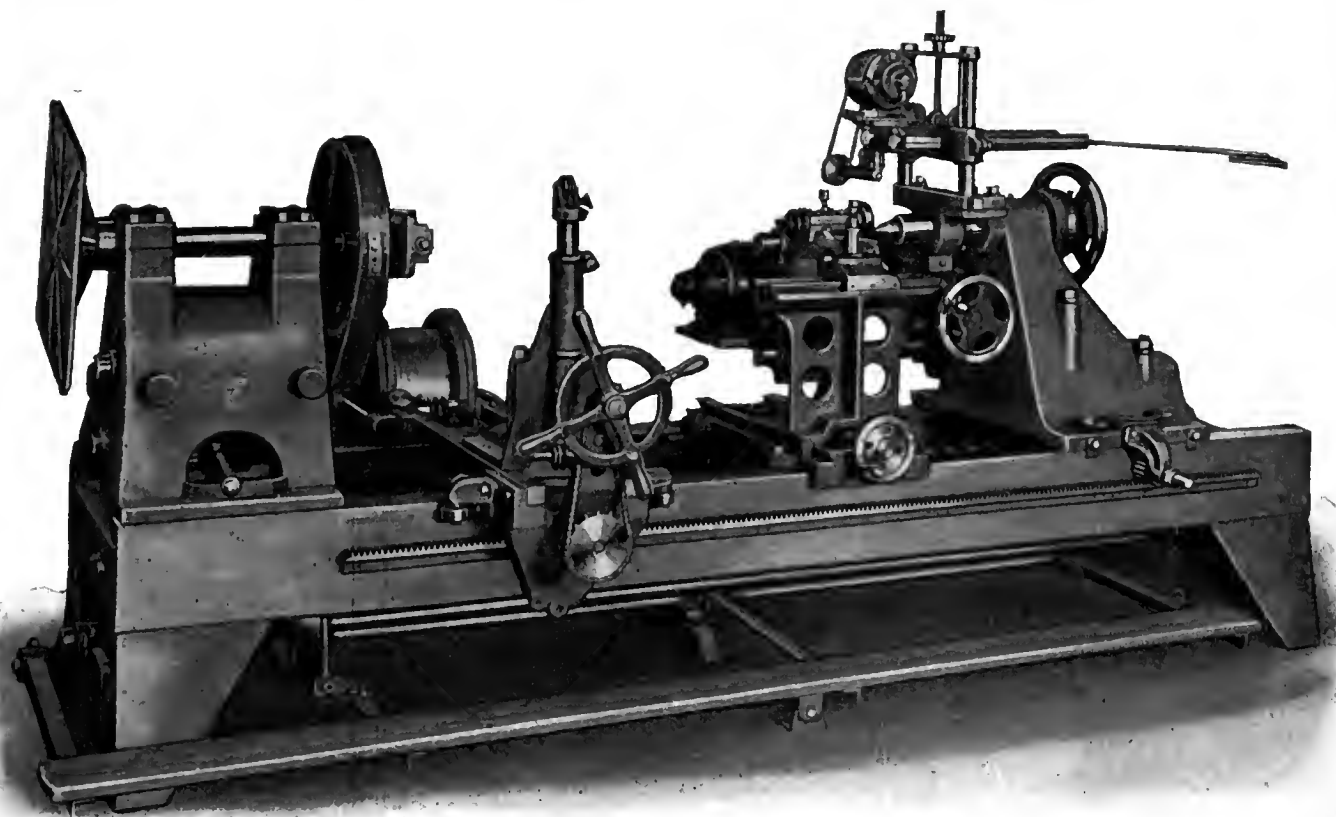
## *Modern Labor-saving Machines*

### *Peerless Armature Machines*

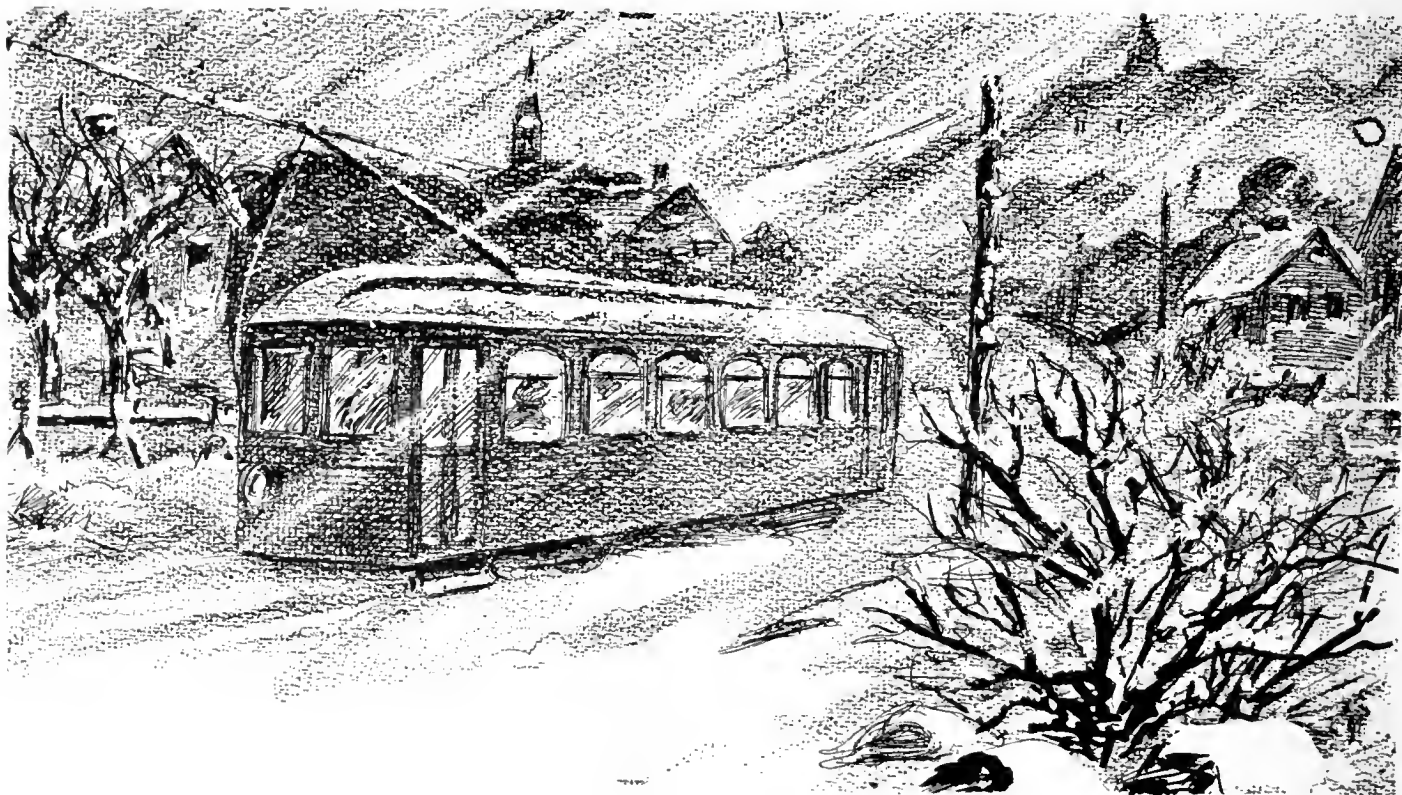
With one of these machines installed in your shops you could first wind your coils; put them in the slots and solder to commutator bars; band with wire that is maintained under even and uniform tension; on a machine that is under perfect control of the operator at all times; on a machine which, when stopping, automatically locks and absolutely prevents

slack in the band wire by any backlash of the armature. And, finally, grind and slot your commutator. An armature completely repaired on one machine—think of the great reduction of repair costs and labor that would follow.

It will cost you nothing to find out more about this machine. Write for further information.



No. 19409 Peerless Heavy Duty Universal Armature Machine, consisting of Banding Machine, Commutator Slitting Machine, Commutator Grinding Machine, Commutator Turning Machine and Field Coil Winding Plate



## Winter's Wild Winds *Should lead you to specif*

Never before in the history of electric railroading has such havoc been wrought to overhead construction as by the winter of 1917-18.

Ordinary copper wire was helpless in many localities against the **extraordinary** loads due to snow, ice and high winds.

That under similar conditions "Copperweld" Steel Wire of equal gauge would have borne the burdens successfully is apparent on account of very much greater tensile strength.

A prime requisite in a conductor is insurance against interruption to service and that is exactly what you can secure most economically with Copper-Clad Steel.

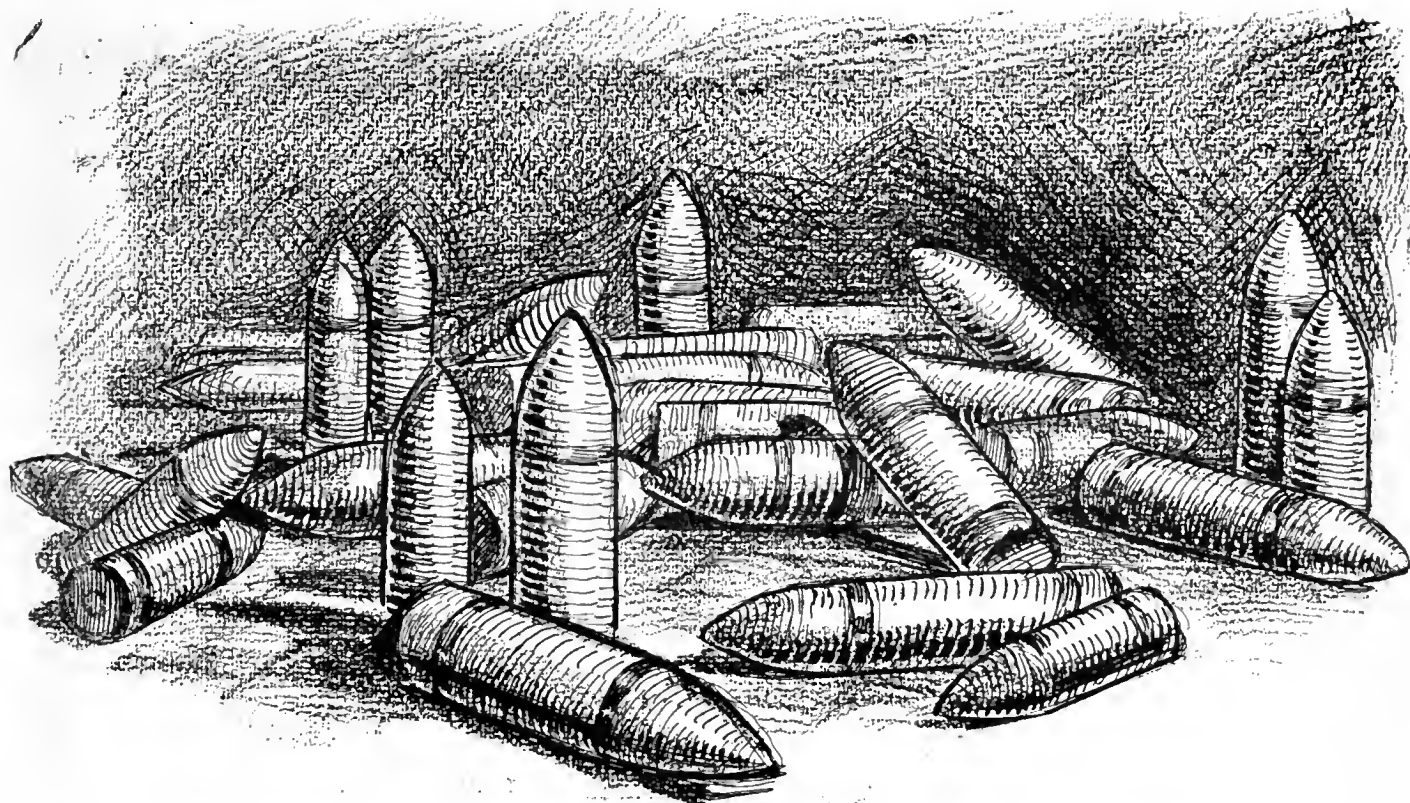
Made from the product of the Copper Clad Steel Co.

# PAGE STEEL &

*Established 1883*

General Sales Office  
Page Steel and Wire Co.  
30 Church St., New York





## War's Call for Copper *"Copperweld" steel trolley wire*

Copper is too costly and too badly needed in these days to be used for wearing purposes. Its proper place is in feeder for conducting purposes.

Steel alone is too poor a conductor for many situations; but steel clad with copper has a much higher conductivity in addition to affording easier contact for the current collector.

The combination afforded by the "Copperweld" Steel Wire is also cheaper to buy as the price per pound is cheaper than copper, weighs 7% to 10% less (size for size).

A prime requisite in a conductor is ultimate as well as initial economy. The greater durability and lower price of "Copperweld" Wire give this assurance.

Pittsburgh, Pa. Drawn and sold exclusively by

# WIRE COMPANY

*Monessen, Pa.*

Western Sales Office  
Steel Sales Corporation  
Chicago, Illinois



# *Minimize Pull-ins for Wheel Renewals*

Hartman Centering Center Plates are reducing pull-ins on 95 electric railways in the United States and Canada.

They are reducing the wear of wheel flanges—doubling the life of wheels—cutting in half the costs for wheel renewals and grinding.

Hartman center plates are also reducing car nosing and they decrease power consumption on curves by 17%. They are actually accomplishing these results and 72% repeat orders on our books show the satisfaction these bearings are giving.

## Holden & White Inc.

Electric Railway Distributors for The Joliet Railway Supply Company

1508 Fisher Bldg., Chicago

National Rwy. Appliance Co., New York, Washington; Grayson Rwy. Supply Co., St. Louis; W. M. McClintock, St. Paul; Alfred Connor, Denver; C. E. A. Carr, Toronto; F. F. Bodier, San Francisco; S. I. Wallis, Los Angeles; W. F. McKenney, Portland; O. H. Davidson Equip. Co., Salt Lake City.


### Put Them On Your Old Cars

Hartman Center Bearings can be easily placed on old cars as well as new. Send for descriptive catalogue and dimension sheets. Try a few sets.



# Hartman Centering Center Plate



A detailed illustration of a hand operating a Rico Coasting Recorder. The hand is shown from the side, with the thumb and index finger pressing down on a lever. The lever is connected to a mechanical arm that moves up and down. The recorder is a rectangular box with a circular dial on the front. The dial has the word 'RICO' in large, bold letters. The background is a textured, stippled gray.

Begin Your  
Fuel and Labor  
Saving Campaign  
at the Controller  
with

## Rico Coasting Recorders

*More coasting will*

Save coal at the power plant

Secure more service per car

Prevent waste of man power.

These are not possibilities or probabilities; they are *facts*. Scores of Rico operators have put these economies into practice.

*Let us name a few examples  
on the following pages—*

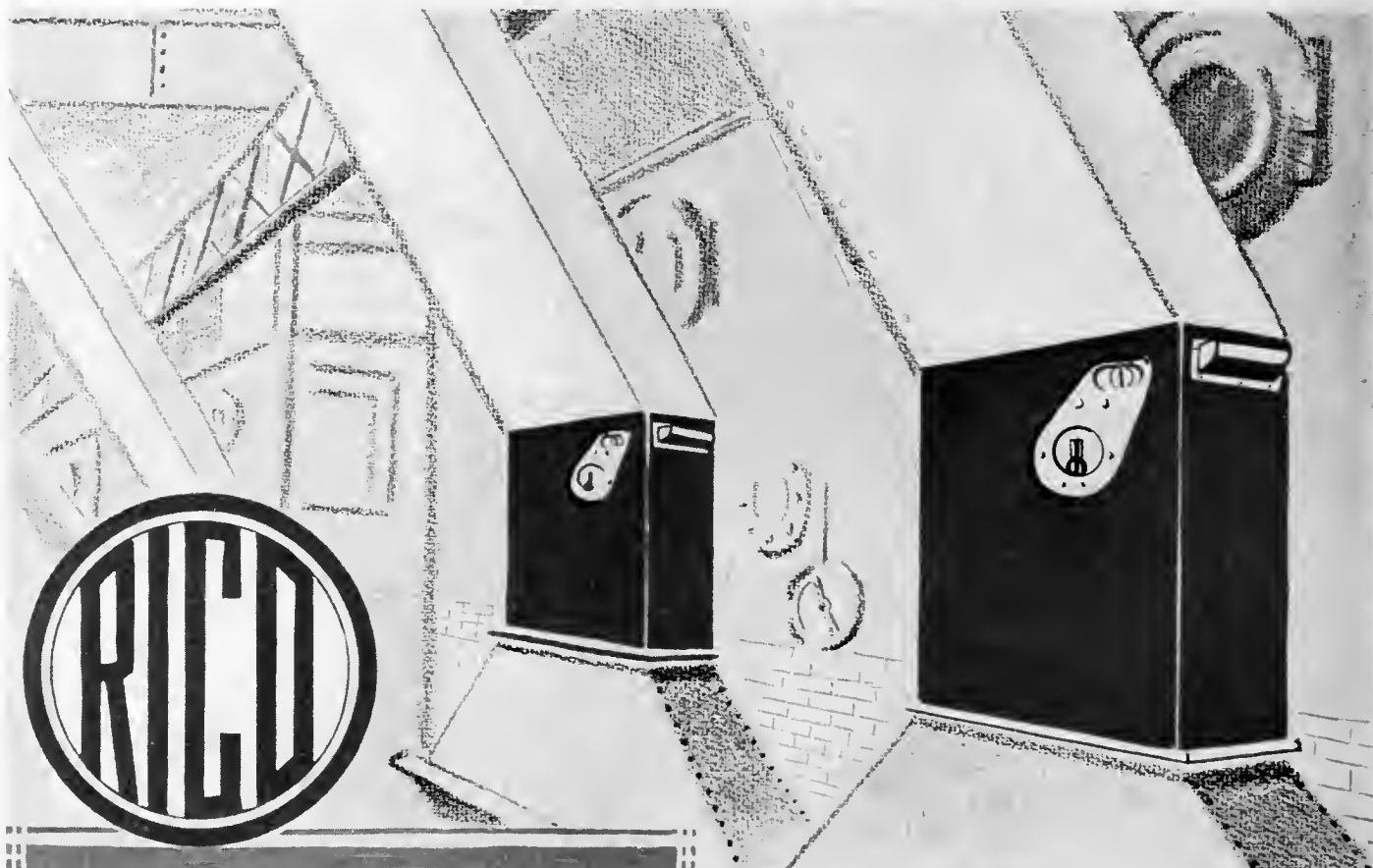
**Time is the Essence of Railroading**

RAILWAY IMPROVEMENT CO.



61 BROADWAY, NEW YORK





## Rico Coasting Recorders

Save Coal at the  
Power Plants

Of the Chicago Elevated Lines, to the extent of 1800 tons in a single month (Dec., 1917, compared with Dec., 1916).

Of the Key Route, California, to the extent of \$1 to \$2 per day per man, or a large part of a ton per car.

Of the New York Municipal Railway to the extent of approximately 1 ton on a *single round trip* of a 5-car train, between Union Square, New York, and Coney Island, a run of 26 miles.

Overhead, underground, on the surface, the Rico Coasting Recorder is a proved guide to the correct use of the power for which fuel is purchased.

# Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO.



61 BROADWAY, NEW YORK



## Rico Coasting Recorders

Secure More Service  
Per Car as on

	Cars Required	
	Before	After
The Knoxville Railway & Light Co. (on a city line).....	4	3
The Pacific Electric Railway (on a suburban line).....	5	4
The Northern Texas Traction Co. (on the Polytechnic-Belknap Line) .....	6	5

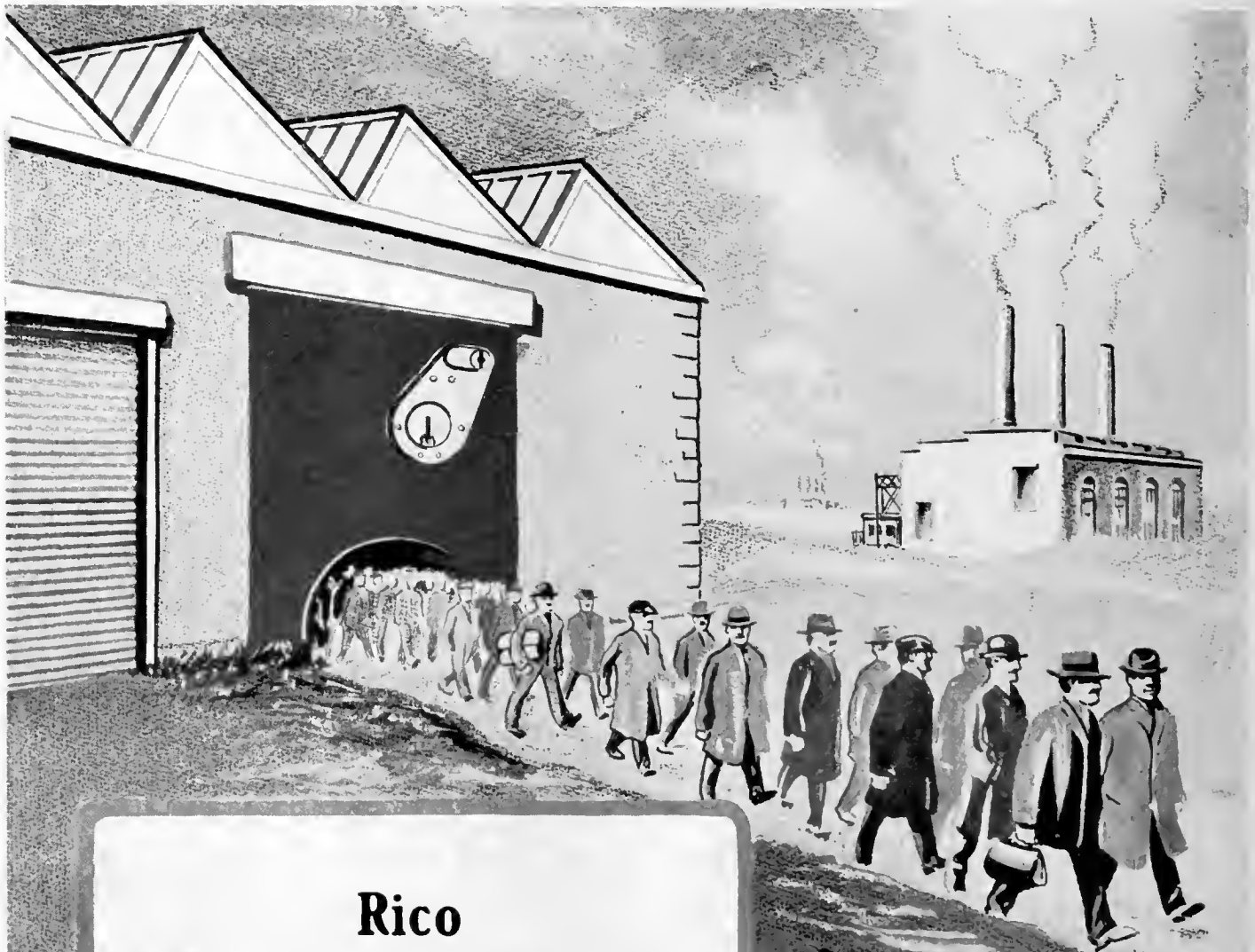
If a user of Rico Coasting Recorders is short of cars, *drawing in the slack* permits increase in service without buying new cars. And if he is long of cars, he can withdraw those which are heaviest and least efficient!

# Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO.



61 BROADWAY, NEW YORK



## Rico Coasting Recorders

Prevent Waste of  
Man Power

At the power plant, 10 to 20 per cent fuel reduction through scientific coasting of the cars saves in the labor force of the boiler room.

In the shops, the correct operation of cars taught by the Rico Coasting Recorder, and the resulting reduction in maintenance, saves both electrical and mechanical labor.

In the transportation department every car eliminated through reducing slack in the line saves an average of two crews a day.

Don't let the matter of financing the purchase of Rico Coasting Recorders worry you. We will be glad to assist you.

FUEL and LABOR  
CONSERVATION  
WILL HELP WIN  
THIS WAR



# Time is the Essence of Railroading

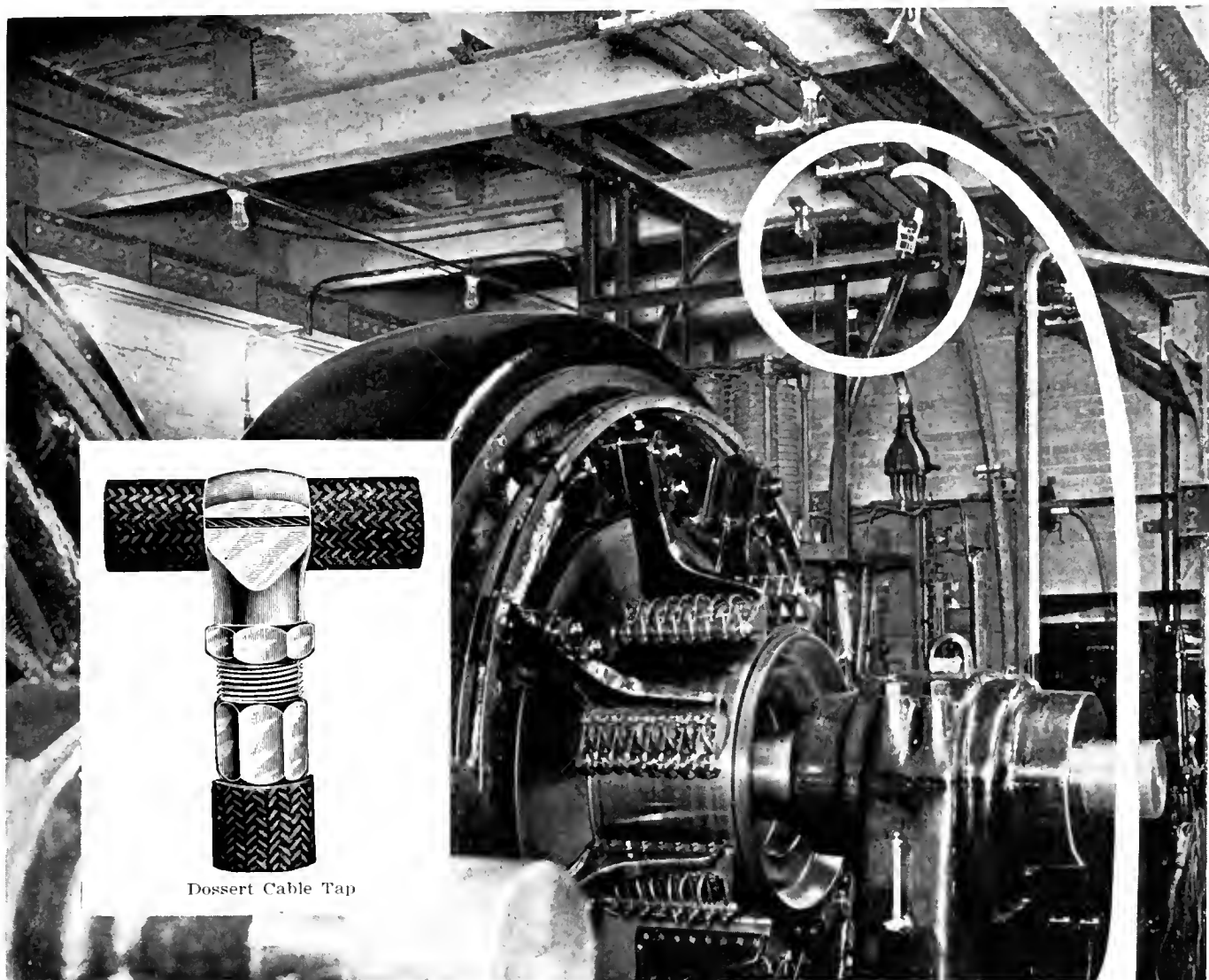
RAILWAY IMPROVEMENT CO.



61 BROADWAY, NEW YORK

# Dossert Connectors

An example of DOSSERT efficiency—three DOSSERT connecting leads from Westinghouse rotary converter to Positive, Negative and Neutral 3,000,000 cir. mil BUS CABLES at the 74th Street Station of the Interboro.



Dossert Cable Tap

DOSSERT Solderless Connectors invariably mean less heating of the cables when running on overload, and positive freedom from insulation spoilage when fitting, as no hot soldering is required.

DOSSERT connectors are made in every necessary size and form for all conceivable types and sizes of conductors.

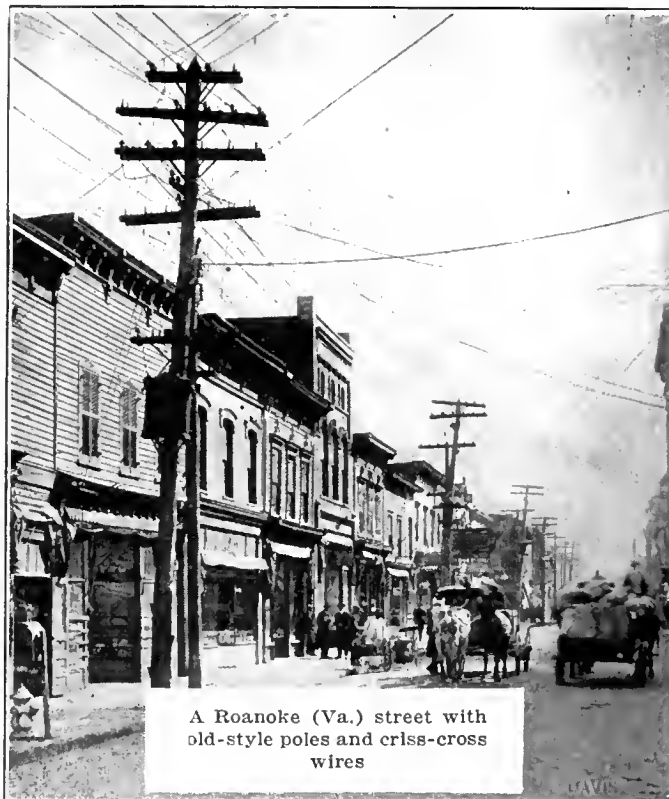
Our catalog gives much interesting information why DOSSERT should be *standard* for electrical connections. A copy is yours for the asking.

## DOSSERT & COMPANY

H. B. LOGAN, President

242 West 41st Street, New York





A Roanoke (Va.) street with old-style poles and criss-cross wires



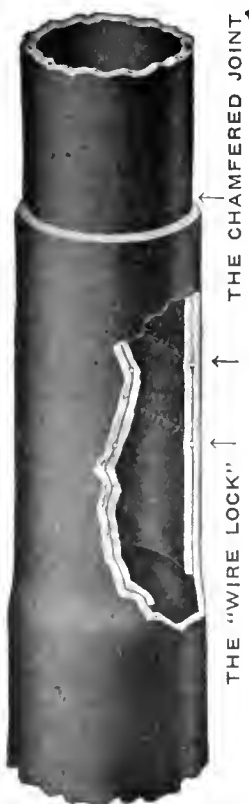
The same spot after Elreco Tubular Poles had been installed

# We Make a Single Pole Do the Duty of Two—and do it better!

Do you know of any sensible reason why trolley poles should not be used for carrying light and telephone wires at the same time? The only justifiable objection made heretofore was that the ordinary pole cannot stand the additional heavy strains. However,

## Elreco Combination Poles

have been built to meet the demands for a straight, graceful and strong pole for trolley, power and light services combined. Ask for detailed information.



We are backing this boy and the Government—

Elreco Tubular Poles combine

Lowest Cost  
Lightest Weight  
Least Maintenance  
Greatest Adaptability

**ELECTRIC RAILWAY  
EQUIPMENT CO.**

CINCINNATI, OHIO

New York: 30 Church Street





## FULL GAGE • FULL WEIGHT

(or a little better)

**All the Way Through and Not  
Merely on the End Sections**

That's the *Weigh* With

## "ARMCO" IRON CULVERTS

Put them on the scales and see that they weigh what they should. This is one good practical test for corrugated pipe in general.

Every detail of construction of "Armco" Iron Culverts is in keeping with the quality of their material. Their material is

## The Iron That's Made to Last

**Write or phone** the Nearest Manufacturer for full information on Rust-Resisting "Armco" Iron Culverts, Flumes, Street and Road Signs, Sheets, Roofing and Formed Products.

Arkansas, Little Rock—Dixie Culvert & Metal Company  
California, Los Angeles—California Cor. Culvert Company  
California, West Berkeley—California Corrugated Culvert Company  
Colorado, Denver—R. Hardesty Mfg. Co.  
Delaware, Clayton—Delaware Metal Culvert Co.  
Florida, Jacksonville—Dixie Culvert & Metal Co.  
Georgia, Atlanta—Dixie Culvert & Metal Co.  
Illinois, Springfield—Illinois Corrugated Metal Company  
Indiana, Crawfordsville—W. Q. O'Neill Co.  
Iowa, Des Moines—Iowa Pure Iron Culvert Co.  
Iowa, Independence—Independence Corrugated Culvert Co.  
Kansas, Topeka—The Road Supply & Metal Co.  
Kentucky, Louisville—Kentucky Culvert Co.  
Louisiana, New Orleans—Dixie Culvert & Metal Company  
Maryland, Baltimore—Wm. M. Baker, Munsey Building

Massachusetts, Palmer—New England Metal Culvert Company  
Michigan, Bark River—Bark River Bridge & Culvert Company  
Michigan, Lansing—Michigan Bridge & Pipe Co.  
Michigan, Bay City—U. S. Bridge & Pipe Co.  
Minnesota, Minneapolis—Lyle Corrugated Culvert Company  
Minnesota, Lyle—Lyle Corrugated Culvert Co.  
Missouri, Moberly—Corrugated Culvert Co.  
Montana, Missoula—Montana Culvert & Flume Company  
Nebraska, Wahoo—Nebraska Culvert & Mfg. Co.  
Nevada, Reno—Nevada Metal Mfg. Co.  
New Hampshire, Nashua—North-East Metal Culvert Company  
New Jersey, Flemington—Pennsylvania Metal Culvert Company  
New York, Auburn—Pennsylvania Metal Culvert Company

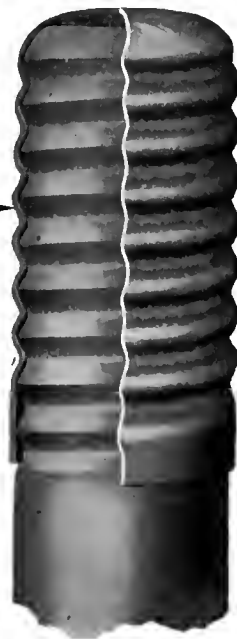
North Dakota, Wahpeton—Northwestern Sheet & Iron Works  
Ohio, Middletown—American Rolling Mill Co.  
The Ohio Corrugated Culvert Co.  
Oklahoma, Shawnee—Dixie Culvert & Metal Co.  
Oregon, Portland—Coast Culvert & Flume Co.  
Pennsylvania, Warren—Pennsylvania Metal Culvert Company  
South Dakota, Sioux Falls—Sioux Falls Metal Culvert Company  
Tennessee, Nashville—Tennessee Metal Culvert Company  
Texas, Dallas—Wyatt Metal Works  
Texas, El Paso—Western Metal Mfg. Co.  
Texas, Houston—Lone Star Culvert Co.  
Utah, Woods Cross—Utah Corrugated Culvert & Flume Company  
Virginia, Roanoke—Virginia Metal & Culvert Co.  
Washington, Spokane—Spokane Culvert & Flume Company  
Wisconsin, Eau Claire—Bark River Bridge & Culvert Company

Canada: Canada Ingot Iron Co., Ltd., Guelph, Sherbrooke, Winnipeg, Calgary



One 33,000 volt line on Bo-Arrow arms and Peirce Forged Steel Pins. Two 33,000 volt lines on Steel Angle arms and Peirce pins. (Pittsburgh, Pa.)

# Bo-Arrow Steel Cross Arms and Peirce Pins



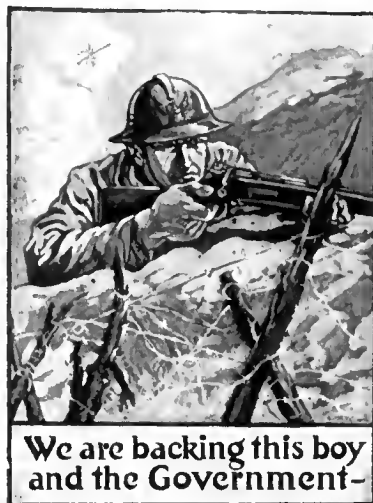
The threads of the thimble fit loosely over the threads of the pin, and a thin cork disc is provided between the top of the pin and the thimble. Under expansion the pin simply rides up further in the thimble, the cork disc compressing. None of the strain is communicated to the insulator.

Peirce pins are guaranteed to stand strains equal to their rated strength with a deflection of less than 10 degrees, and without danger to the insulator.

Our booklet tells about "Continuity—and How" to obtain it. Send for a copy. The Hardware **MAKES** the Line—Hubbard makes **THE** Hardware.

Your best insurance against  
insulator breakage

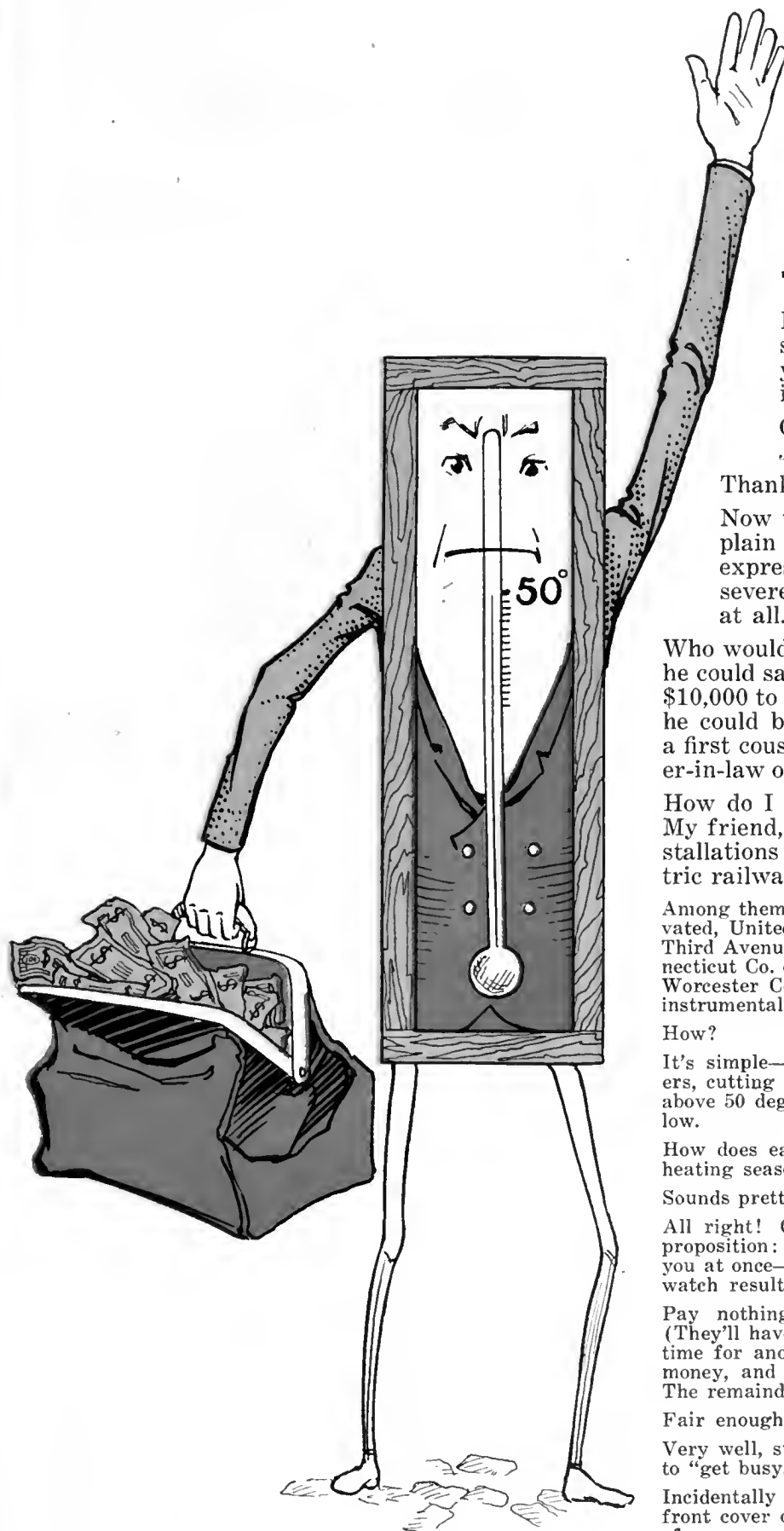
**HUBBARD &  
COMPANY**  
PITTSBURGH, PA.



**We are backing this boy  
and the Government—**



33,000 volt line on Bo-Arrow arms and Peirce Pins; 2200 volt primary on wood arms with Peirce clamp pins; 440 volt secondary on Peirce secondary racks. (Pittsburgh, Pa.)



# Halt—

## A Message for You

Excuse my abruptness, but the boss sent me out to follow up that letter you got recently and I'm going to do it or—

Oh, pardon me, my name's *UTILITY JACK*.

Thanks; glad to know you, too.

Now that the ice is broken, I want to explain a little idiosyncrasy of mine. If the expression on my face appears somewhat severe, it isn't because I'm grouchy. Not at all.

Who wouldn't look severe, if he knew positively he could save electric railways all the way from \$10,000 to \$100,000 a year and some of the folks he could benefit, courteously put him down as a first cousin to Baron Munchausen, or a brother-in-law of Ananias? Who wouldn't look—

How do I know I can save that much money? My friend, do you realize that I've got 8,000 installations to my credit on more than 100 electric railways, big and little?

Among them are: Chicago Surface Lines, Chicago Elevated, United Railways of Baltimore, Boston Elevated, Third Avenue of New York, Pittsburgh Railways, Connecticut Co. of New Haven, Springfield (Mass.) St. Ry., Worcester Consolidated—all saving money through my instrumentality.

How?

It's simple—thermostatic control of the electric heaters, cutting off the energy when the temperature goes above 50 degrees, cutting it in again when it drops below.

How does earning my full purchase price in the first heating season strike you?

Sounds pretty good, you say, IF—

All right! Give me a chance to prove it. Here's my proposition: I'll put some of my "fellows" to work for you at once—ten or a thousand, any number you say—watch results.

Pay nothing until January 1st, 1919. Half then. (They'll have earned it and more by that time.) Mark time for another six months, incidentally saving more money, and on July 1st, 1919, pay half the balance. The remainder on January 1st, 1920.

Fair enough?

Very well, suppose you answer that letter and tell me to "get busy."

Incidentally keep a weather eye out for next week's front cover of the Journal. Meanwhile if you see any of my representatives just tell them that you saw me.

See you later.

*Cordially yours,*

**UTILITY JACK**

**Railway Utility Company, 151 W. 22nd St., Chicago**

J. H. Denton, Eastern Manager,  
1328 Broadway, New York

F. O. Grayson, Representative,  
600 La Salle Building, St. Louis, Mo.

O. W. Meissner, Representative,  
10 St. Antoine St., Montreal



On the Pullman Cars

# The ECONOMY Meter



The Sangamo ECONOMY Railway Meter is a rugged, time-tried device, the element of which is the same as that used in the well-known Sangamo d.c. meters for every electrical service. Its element has the same design as that of the meters which control the lighting equipment on all the cars of the Pullman Company and on several steam railways, and on battleships and submarines of the U. S. Government. It is standard on the electric trucks of nearly all manufacturers of electric vehicles.

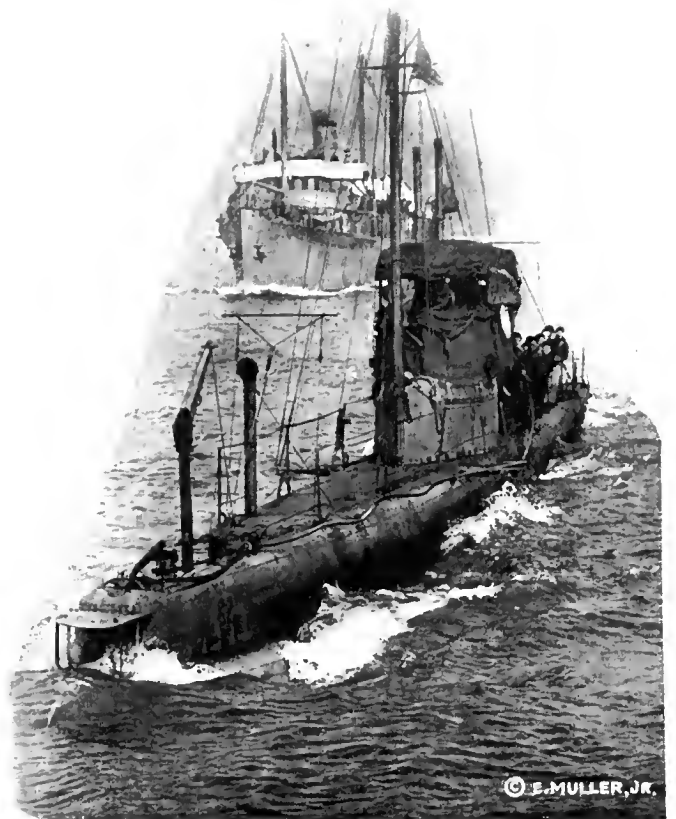
**Economy Electric**  
1691 Old Colony Bldg

*"The Watchdog of Your Power"*





On Battleships



On Submarines

# Is a Rugged Device

In fact, it is widely used wherever there is need for an electrical energy-measuring device that has demonstrated its ability to withstand the punishment of rough usage, including the jarring incident to electric railway operation.

The electrical characteristics of The ECONOMY Meter are guaranteed. Its cost for maintenance, as definitely established by one large property over a period of two and a half years, based on the use of 100 meters, is not more than \$1.00 per meter per year.

ECONOMY Meters on your cars will decrease operating costs.

The ECONOMY Meter induces saving by a method which does not encourage practices contrary to "safety first."

It will start paying for itself immediately.

*Let us send you further details. Write for our new booklet on Efficient Electric Railway Operation.*

**Devices Company**  
Chicago, Illinois

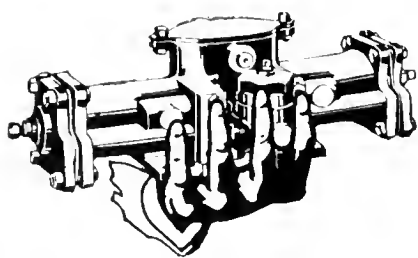


On Motor Trucks





© International Film Service, Inc.



# Ask the Girls

## National



# Broadway's Car Cashiers

*(A Composite Interview)*

When they first asked me how would I like to be collecting fares on a street car, I said I wouldn't like it a bit.

But when I took a ride on what they used to call the hobble-skirt cars, I changed my mind. That's a woman's privilege, you know.

Why, it's just lovely. No bell cords too high for a short girl like me; and a

seat that makes some of the passengers call me "The bird in a gilded cage."

But the easiest part of the job is the opening and closing of the doors. Not a thing to do but just tap a little thingumajig with my foot—and another thingumajig called a door engine does the rest.

Transfer, sir?

## NATIONAL PNEUMATIC COMPANY INC.

50 Church St. New York



515 Laflin St. Chicago

# —They Know Pneumatic Door Control



# Moving



When your bonder has finished welding a bond, he sets the

## PORTABLE WELDER

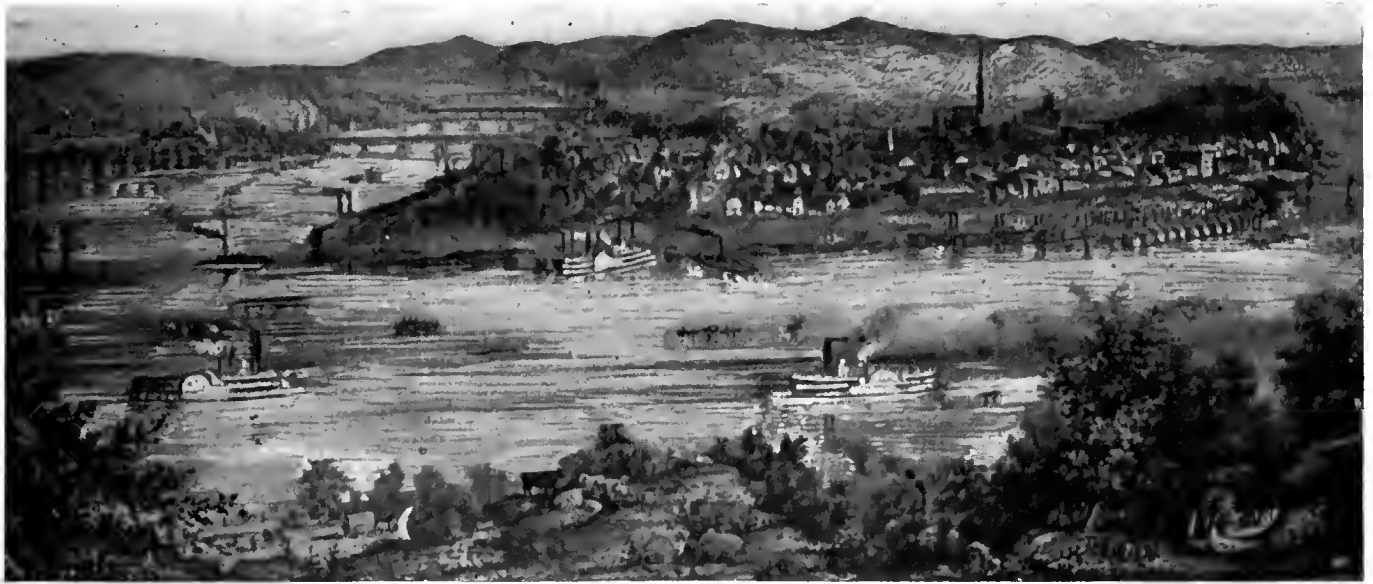
on top of the rheostat, removes the trolley pole from the trolley and sets it in the socket provided for it, and pushes the whole outfit to the next joint.

The wheels on the rheostat are equipped

with roller bearings, making it possible to move from joint to joint with almost no tractive effort on the part of the operator. Bonders are agreeably surprised at the ease with which this light outfit can be handled.



**The Electric Railway Improvement Co.**  
Cleveland



Pittsburgh, Pa., at the time this picture was taken, consisted of 13 rolling mills, 30 large foundries and about a hundred smaller plants with the necessary accommodations for the workmen and their families—a total of 46,000 people. Its annual output was valued at \$7,000,000.

Pittsburgh & Allegheny from Coal Hill 1849

## Three Rivers Carried Its Trade

before the railroads had grown strong enough to make a bid for the bulk of the freight traffic. But with the development of the huge coal and oil fields, the Smoky City began to expand rapidly, and soon became one of the greatest railway centers in the world, with yards accommodating nearly 100,000 freight cars.

Railway shops, steel plants and factories for electric machinery, air brakes and other equipment render this city of special import-

ance to the electric railway field. Its far-flung suburbs and factories make exceptional demands upon the transportation facilities and more than a hundred suburban lines radiate from Pittsburgh in all directions. The Pittsburgh Railways Co. alone operates 605 miles of track, in order to serve the 600,000 people now living within the limits of Pittsburgh.

And during the entire period of this great industrial and transportation development

# Galena Oils

and Galena Service have been proving their value to the railway industry. It is the unvarying Galena custom to examine thoroughly all the conditions bearing upon the lubrication question, and then to co-operate fully with the railroad in obtaining the lubricants best suited to its requirements—a policy more than half a century old!

**Galena-Signal Oil Co.**  
Franklin, Pa.



# Cutting Down Construction Cost

You can load your ballast or paving material and unload it alongside of the track with **fewer men** and without hampering your passenger schedules, even in congested districts, if your rolling stock includes

## THE DIFFERENTIAL Electric Dumping Car

This all steel car is designed for side dumping by means of an electric motor. It can be tilted with perfect safety by an unskilled laborer.

Loading can be done while in the tilted position at a large saving in shoveling cost.

Trains of two, three or more cars can be operated for hauling the material, which each car dumps alongside of the track far enough away to insure ample clearance for passenger cars. Only one man is required for dumping.

Used by leading city and inter-urban roads. A money-saver wherever operated.



Get in touch with us today concerning the application of these cars to your lines.

Write for Bulletin No. D-3.

**Differential Car Co., Inc.**  
141 Broadway, New York



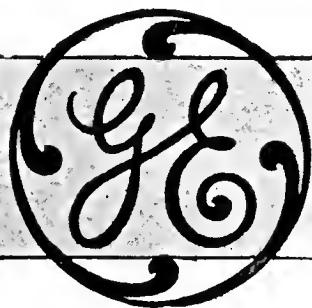


## The Coal that can be saved

If all power plant engineers would make sure that every boiler was being worked at its highest efficiency, the saving of coal could be measured in trainloads.

G-E Flow Meters furnish the means of knowing just what the individual boilers are doing. Inefficient operation is detected at once and can be remedied.

Write our general office for a copy of the new booklet, "A Guide to Boiler Economy."



# General Electric Company

General Office: Schenectady, N. Y.

Sales offices in all large cities

# Less Weight to Propel Lower Costs of Operation



What General Electric car equipment offers in the saving of weight is shown by the fact that the combination of two GE-258 motors and K-63 control weighs a full ton less than the lightest two motor equipments previously available.

And every ton taken from the weight of the car in city service saves 150 watt-hours per mile or 600 kw.-hours a year on the basis of 40,000 car miles.

But still more important is the application of Safety Cars equipped with specially designed motors, control and air brakes, resulting in increased service to the public at a reduced operating cost.

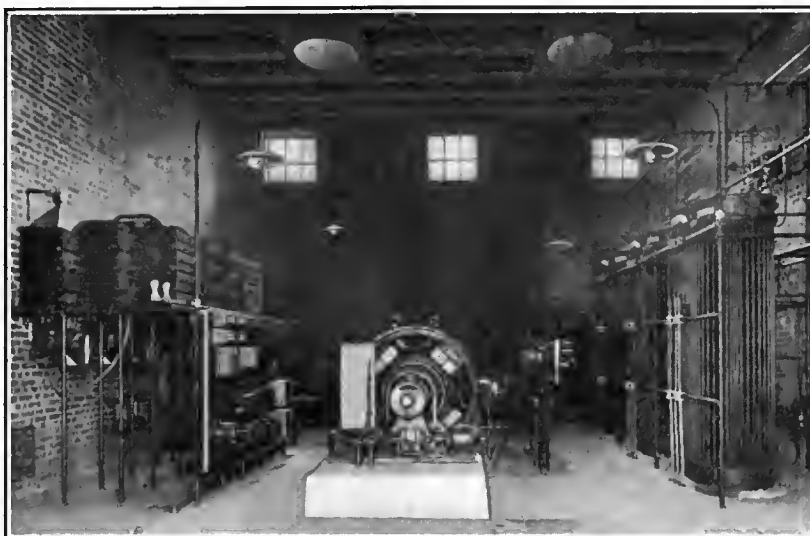
## General Electric Company

General Office  
Schenectady, N. Y.



Sales offices in  
all large cities

# Automatically Controlled Railway Substation



**T**HREE years ago the General Electric Company developed and installed the first automatically controlled substation for railway service. Since that time they have sold a total of fifty equipments in capacities ranging from 200 kw. to 1500 kw.

## General Electric Company

General Office  
Schenectady, N. Y.



Sales offices in  
all large cities



## Straight line Suspension

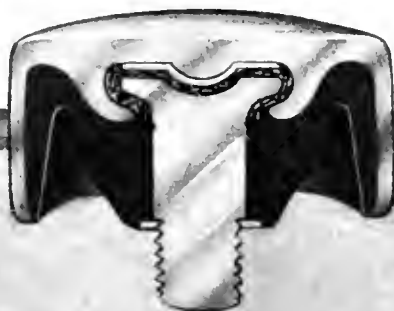
A glance at the sectional view tells the story of "Why this suspension never lets go."

Notice the stud which is mechanically fastened to the shell.

This construction means that the strain becomes practically one of metal to metal.

The molded insulation acts only as a waterproof seal and is never subject to strain.

7573



# General Electric Company

General Office:



Schenectady, N. Y.

Sales Offices in All Large Cities

# Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 51

New York, Saturday, March 16, 1918

Number 11

## Are Car Shop Kinks Always Real Economy?

"NECESSITY is the mother of invention," but there have been a great many inventions for which it would be difficult to prove the necessity. Some shop foremen think they are not earning their salaries unless they are continually inventing something. Without any desire on our part to discourage ingenuity and progressiveness, it is nevertheless true that men with a leaning towards invention are apt to waste a lot of their own time and that of their employees as well as a great deal of money and energy in devising new "stunts," when there are commercial products already available for accomplishing the purpose desired, and doing it better and cheaper than it could be done by the proposed invention.

Anyone who has a problem of this kind before him would do much better to investigate the methods and apparatus which have already been devised for doing work of this kind rather than to attempt to manufacture something of his own. The manufacturing companies have engineering specialists whose services are at the disposal of their customers. These experts are always willing and eager to help in solving knotty problems in construction or maintenance, and a small customer will receive the same consideration as a large one. In addition, the ELECTRIC RAILWAY JOURNAL is always at the disposal of railway men and others who wish assistance in solving any particular problem. Of course, there are many opportunities for progressive master mechanics to render real service by introducing economical practices in their shops, but the real duties of such men should always be kept in mind. Anything that interferes with these duties, even if it is the invention of a shop device, involves the danger of not being in the line of real economy.

## "Organize—Deputize—Supervise"—

### A Formula for Administrative Success

E. P. RIPLEY is president of the Atchison, Topeka & Santa Fé Railroad system. The story of his rise from a dollar-a-week job to this presidency is told by a writer in the current number of the *American Magazine*. Mr. Ripley summarizes the experience of a long business career, in so far as it relates to administration, in stating that success on the part of executives consists in organizing, deputizing and supervising. Never was such a formula more urgently needed in our country than at the present moment, when we are struggling to throw off the shackles of inefficiency in preparation for winning the war. Of these three essential duties of every individual who is responsible for the work of others the one most neglected is the

second. It is the height of folly at any time, and especially now, for any man not to be doing the thing that he can do best, that he can do better than anyone else. But this means turning over to others the responsibility and commensurate authority for doing other things that might at one time have been proper for him to do. Many a man wears himself out, fails to develop his subordinates, clogs the machinery of his organization—in short, fails of his full duty to his superiors by failure properly to deputize his work.

## Scarcity of Common Track

### Labor—A Menace to Maintenance

TWO years ago, in commenting editorially upon the scarcity of track labor, we said that the high wages then being paid common labor in this country in munitions work and other fields where this class of labor could be used was having a demoralizing effect upon other industries and that the situation was becoming critical even then. Since that time the construction of the great military camps and the vast work now going forward in the shipbuilding field have made conditions many times worse. The government contractors, doing their work upon the cost and percentage basis, have bid against each other and have even revived the abominable padrone system in their efforts to obtain labor to such an extent that other industries, including the electric railways and even the big subway and sewer contracting firms, are being seriously handicapped in their efforts to secure and hold laborers.

The electric railway industry, as has frequently been pointed out in these columns, is tied to a fixed income, but the contractors mentioned above are now almost in the same fix, since their contracts were based on a pre-war labor cost base, while the present wage price has advanced by leaps and bounds until they can bear the strain but little longer. It is even predicted that the subway and sewer contractors in New York will have to stop soon unless some means is adopted to relieve the situation. With these powerful contracting firms in such a position, the situation of the electric railways must be worse, and it is safe to predict that they will not be able to undertake much reconstruction this year. In fact, they will be lucky if they are able to retain a sufficient supply of labor to carry on even ordinary maintenance work to the extent that this work should be done.

The Public Service Commission for the First District, State of New York, has recognized this critical condition in the labor market and has made certain suggestions for legislative enactments which may help the subway contractors to complete their new work without profit. As yet no similar relief from these conditions has been suggested for the electric railways,



although one would think that the maintenance in good condition of existing roads should be as important to the public as the completion of new lines. Yet it is quite apparent that the existing roads cannot be adequately maintained if the labor is not available.

### **Car Equipment Failures Should Be Carefully Analyzed**

THE need for analysis is evident in all phases of railway service. In none is it more so than in the division of the subject which has to do with the failures of car equipment. It is the very essence of successful operation that cars be kept on the street with a minimum of interruption, and to this end it is imperative that the many detailed defects influencing this result shall be carefully recorded and diligently analyzed.

Too much stress can hardly be laid on the need for analysis, as without a thorough understanding of the failures and their underlying causes it is impossible to form any definite policy for their correction. This means either the replacement of the offending part with a duplicate of the original, bound sooner or later to repeat the breakdown of its predecessor, or the arrival at a "half-baked" conclusion as to the cause of the trouble and the adoption of a new and supposedly improved part. The latter may require considerable outlay yet be really of a nature which will not solve the problem because it does not touch the heart of it. Many a piece of apparatus has been thrown into the discard and replaced with another for which wonders have been prophesied, when the original one would have proved entirely satisfactory, with some slight detailed attention or maintenance. The expenditure was therefore incurred simply and solely as the result of a lack of proper analysis.

This is a function which, though not possessed by all in an equal degree, is like many others in that it is susceptible of development by use, and the commencement of its growth is the recognition of its necessity. A broader understanding of this fact and its intelligent application would go a long way toward raising the standard of operating methods.

### **Front-End Fare Collectors As Rear-End Accelerators**

IT WILL BE recalled by our readers that the first Washington report recommended front-end fare collection at certain places in the congested zone of the Capital Traction Company. The latter company was not slow to try this plan of accelerating passenger movement. As worked out under J. H. Hanna, general manager, the front-end collector actually accelerates traffic at both ends of the car. After he has passed a reasonable number of people through the front entrance, he hastens to the rear to help the conductor. It is well known that the fellow who holds up a car longest at a stop is the late arrival who insists on boarding the car, regardless of the conductor's efforts to close the doors and clear the way for the next car. Here is where the gentle but firm arm and voice of the experienced street inspector prove very useful, both in saving time and avoiding accident.

### **Chicago Authorities Might Profitably Read the Beeler Report on Boston Traffic**

PUTTING aside for a time all consideration of the legal and financial aspects of a proposed ordinance for unified operation of the surface and elevated lines in Chicago, the authorities have been debating some interesting features of service requirements. Speaking for the management of all companies, President Busby has been discussing the recommendations made last year by the Traction and Subway Commission and a few modifications proposed by the companies.

The discussions have had to do largely with rapid transit improvements. This is the all-important transportation topic in Chicago where the surface cars operate on nearly every section and half-section line throughout the city, while elevated construction has been at a standstill for years. Rapid transit facilities are costly, and Mr. Busby has made the point that subways should not be required where elevated lines will answer the purpose, and elevated construction should not be insisted on where the public can be accommodated by surface lines.

All the authorities have agreed that subways are needed in the downtown district of Chicago where the capacity of elevated and surface lines has long since reached the point of saturation. They may be required later on in other heavy centers of travel. Elevated construction, while more costly than surface tracks, is also under certain circumstances more desirable, but there is a limit fixed by good judgment to the distances for which such extensions should be built.

The Chicago aldermen on a trip to Boston last year were impressed by the combination of surface and rapid transit facilities in that city. If they have read the Beeler report to the Massachusetts Public Service Commission, however, they may discover a basis for serious reflection in the finding that the total cost of service for each 5-cents' worth of gross revenue is 7.23 cents on rapid transit lines, 4.86 cents on surface lines, and 8.10 cents on surface cars using subways, tunnels and viaducts.

In the long run the people must pay for what they get. If it is more convenient to have a rapid transit line within one block of everyone's home, it is also more costly. The 5-cent car fare is not made of rubber. It has been supposed that it would pay reasonable charges for labor and material and a fair return to the investor. But when labor and material costs increase as they have in recent years, these charges must be met in some way. Either the passenger must pay an extra fare or the public must agree to eliminate all non-transportation charges, such as paving right-of-way, maintaining such pavement and reconstructing tracks torn up for sewer construction and other city work. If the people not only refuse to make these concessions but insist on the most expensive type of construction for service in the least remunerative sections of their community, they must be prepared in some other way to reimburse the company for the service thus demanded.

The proposed plan for Chicago does not contemplate burdening the public with additional taxes. For this reason any system which is arranged for must be self-supporting. All charges for return on the investment as well as for operation must come out of the rate of

fare which is agreed upon. This means that the fare must either be increased or it must be relieved of all non-transportation charges.

Chicago seems well on the way toward a settlement of its transportation problem. This attitude must be encouraged. The city authorities and the people will do well to disregard the obstructive tactics and specious arguments of the small group of fanatics who have so long held up a settlement while other cities have been making fair arrangements designed to give the people better urban railway facilities.

## Why Must We Waste

### 85 Per Cent of the Heat in Fuel?

IT IS RATHER unfortunate that, in general, we must depend upon such an elusive source of energy as heat for the propulsion of electric cars. A pound of good coal contains  $3\frac{1}{2}$  kilowatt-hours of potential energy recoverable in heat form. Of this we are doing remarkably well if we deliver 15 per cent at the power-plant busbars. The fundamental reason for the difficulty in the uphill work of changing heat energy into electrical energy is that such transformation is opposed to the natural tendency of energy. In other words, all energy tends to degenerate into the form of heat. The various points at which energy shunts off into space, in heat form, during transformation upward are mentioned by B. H. Blaisdell in an article printed elsewhere in this issue. Some data pointing the way to heat saving were given in an abstract of an article by Eskil Berg last week.

It is loss, loss, all along the line, but there is no reason for discouragement in this if we consider what progress has been made in the last few years. A coal consumption of 4 or 5 lb. per kilowatt-hour is no longer respectable. Many plants are getting along with 2 lb. and the very best with  $1\frac{1}{2}$  lb., high-grade coal being used in such cases, of course. When one considers the elusive nature of heat and the number of transformations and transmissions through which it must go between coal pile and busbar (to say nothing of the transmission system), the wonder is that more does not get away. There are losses in combustion (big ones), in steam production, in transformation to mechanical energy (enormous losses), in friction, in electric resistance and in radiation all along the line.

The very magnitude of the heat losses impels vigorous effort toward economy. The best equipment that can be afforded must be installed. Measuring instruments must be provided to indicate operating conditions. Someone qualified to do so must be studying operation constantly. Every effort must be exerted to stimulate intelligent co-operation on the part of those who ultimately control fuel consumption.

That such procedure will produce results is being proved in many plants. An example is the Manila (P. I.) plant where, under the bonus system outlined in the Feb. 16 issue of this paper, combined with station betterments, the fuel consumption has been reduced nearly 20 per cent in three years.

Even when doing our best, however, we shall still waste from 85 to 90 per cent of the energy theoretically available in the fuel, at least until some genius invents a radically new way to obtain it.

## "Intelligent Economy"

### Must Be the Slogan for 1918

A BUILDER of devices for facilitating track construction and repair recently said to the writer that it is much easier to sell such equipment to contractors than to railway men. The idea seemed to be that the contractor, through the nature of his work, looks at the ultimate saving due to the use of a given machine rather than to the first cost. The reverse, he thought, is true with the operating man due to his wholesome fear of swelling the capital account. Economy in the large sense may mean spending money as well as saving it, even if the money may at times be difficult to secure. Whether or not the diagnosis outlined above is correct, it is, nevertheless, extremely urgent that the railway business be conducted now with a view to ultimate economy rather than immediate expense reduction.

The present is no time for generalities; concentration of purpose—"getting down to hard tacks"—is the order of the day. For this reason the annual maintenance issue of the *ELECTRIC RAILWAY JOURNAL* is dedicated to the cause of true economy. A number of qualified men in different sections of the field have been asked to analyze the possibilities of energy, labor and material savings in lines of work with which they are particularly identified. It is not necessary for them to "qualify as experts" as each has established a reputation for thoroughness in his individual field.

As assistant manager of the railway department of a manufacturing company, Mr. Lambert occupies a vantage point from which he can command a wide survey of this field. Mr. Harte has work of a diversified character as construction engineer of one of the very large systems, particularly in electrical distribution. Mr. Litchfield is a specialist who has had unusual opportunity in analyzing car design problems and testing materials which enter into the construction of high-grade cars. Mr. Squier has had long experience in the rolling stock department of a large city railway system, and now, as engineer of a public service commission, can view railway work from another angle. Mr. Smith is in charge of the testing work of an important rapid-transit system where he comes in contact with a tremendous variety of investigation problems to handle. Mr. Hellmund is an experienced designer of electric railway equipment and has made a specialty of analyzing equipment problems in a large way, as well as in specific details. Mr. Cram is in a position to know "what is what" in way and structure, from his daily contact with the big questions in that line.

This group of seven experts has produced what must be considered a veritable treatise on means for saving everything that is savable in the power plant and on the track and line. They discuss not only the means available for saving but also the intelligent use of the means. Their work, however, is only a part of this issue, for it contains many short articles which bear on the central theme. If the whole thing taken together does not have a powerful influence in directing the thought of the industry to the fundamentals of economy, then nothing of this nature could do so. The editors take this opportunity cordially to acknowledge the splendid co-operation which they have had from the industry in preparing this summary for its benefit.

# Certain Overhead Department Economies

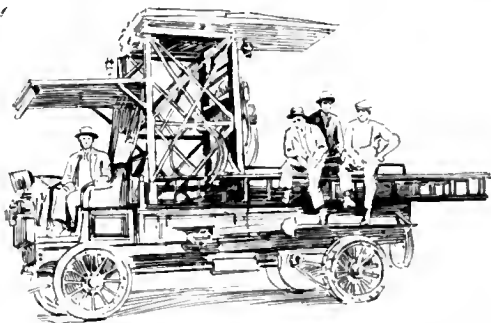
**Specifications Play an Important Part Particularly in This Field—The Author Lays Stress Especially Upon the Opportunity to Save Operating Costs by Doing Overhead Repair Work with Power Equipment**

*By Charles R. Harte*

Construction Engineer The Connecticut Company, New Haven, Conn.

**O**CCASIONALLY, through slow development that has not been appreciated, or even from pure shiftlessness, there exist on a system poor material, bad construction, and inefficient methods which result in heavy losses annually. Such conditions are obvious except to those who have grown up with them, and their correction is only a question of treatment. These are exceptional cases, but there are many instances where leaks exist which in the aggregate cause serious loss without any clear indication of the trouble.

Sometimes the apparent waste is not a net loss because the cost of correction would be greater than the saving secured thereby, but there are comparatively few companies where careful study will not show an opportunity to save a few dollars. Such a study is best made jointly by an old-timer and a man comparatively new to the system. Working alone the latter fails to appreciate the real local peculiarities, although there is no form of excuse for freak ideas which approaches that stock expression of standpatters—"local condi-



The automobile tower wagon permits overhead repairs to be made with minimum interference with traffic

tions." On the other hand, the old-timer is apt to be "too sot in his ways" properly to realize the local faults.

The conditions of to-day demand that no penny be permitted to escape without "doing its bit." As an indication of lines for investigation there are here set down some of the possible sources of leakage in the overhead departments, and a few reminders of what has been done by others in increasing the efficiency of men and appliances.

## Loss Through Unwise Specifications

Rigid adherence to fixed standards will naturally stifle improvement, but on the other hand until sufficient demand is established any new material varying from usual practice means increased cost. The manufacturer must be paid not only for the labor and materials which go into the devices, but for the idle cap-

ital locked up in patterns and the space and labor used in storing them. The larger the quantity of the device used the less extra charge per unit. As a rule, however, the demand is very limited, and the first cost unduly high, and because special designs are almost never kept in stock there is serious loss of time in making replacements.

In some instances the gain more than offsets these disadvantages, but far too often such material owes its existence to accident, to speak charitably, and its continued use to the fact that no test has been made to determine whether or not it is really worth while. If there is to be real efficiency and economy it is extremely important that all materials used should be put through tests carried out with thoroughness, of the sort fully to bring out the essential facts. The costliest mistakes are often those which approach success, for, while a really bad failure sticks up like a sore thumb, a "near success" frequently "gets by" to cause steady and long-continued waste, because such merit as it has is prominent and it is accepted on the strength of that without tests which would develop its bad points.

## Lack of Standardization Makes Supplies Costlier

The American Electric Railway Engineering Association has approved as standard the specifications for overhead material and construction which were submitted by its power distribution committee after careful and extended study. The articles are regular stock patterns with all of the larger makers, and most if not all of the smaller ones, but as yet the association has not made that aggressive campaign which is necessary to establish any standard in an open field.

Here is an opportunity for a decided saving through the definite agreement by the majority of the company members to use one type of article only. This would enable the manufacturers very materially to reduce the capital now tied up in the many varieties which have to be carried, and in the much larger number of patterns which are used only once in a long time. A fair share of this saving should go to the user in the shape of reduced prices.

Until such concerted action is taken little reduction in ruling prices can be hoped for, but even so, as between special and stock designs, there will be found a considerable price difference which in many cases is not by any means paid for by difference in quality. It is greatly to be hoped that the day is not far distant when the term American Electric Railway Association material will be as specifically descriptive, and as universally accepted, as are American Society of Civil Engineers' rails or Master Car Builders' standards.

No less costly than the choice of out-and-out special devices is the specifying of what is apparently stock

material, but requiring it to meet special conditions. Here, too, the gain may offset the extra cost if the requirements are rational, but the insistence, for example, that hangers, pull-overs and wood strains, in which the weight except as fixed by dimensions has little relation to strength, shall weigh "not less than" a fixed value is little short of criminal. Not only must the extra material and the extra labor—and frequently special patterns—be paid for, but every extra ounce that goes into the overhead tends to decrease the life of the trolley wire. Unless this extra material is placed where it will materially increase the service life it is an actual detriment; and if the material already has a sufficiently large factor of safety, added strength is simply wasteful.

Sometimes what is a most desirable test for one class of material is merely a source of expense when applied to similar material having a different use. As yet, nothing has been developed that shows up as does the twisting test the flaws and cracks which do not appreciably affect the tensile strength of trolley wire, but which do constitute its most serious weakness. For similar wire employed as a conductor, but not also forced to act as a track as is the trolley wire, however, this torsion test is entirely unnecessary.

The material, special or otherwise, should be given such tests as will determine whether or not it complies with the requirements specified. If they are rational it is essential they be met; even if they are irrational, so long as they are specified the material ought to meet them. In checking there is always a chance that their undesirability may show up; besides, since good money must be paid for the privilege of imposing unusual conditions, it is well to get something for the outlay.

On the labor side it is equally desirable that the chief of overhead go carefully over the specifications to see that there are written into them no requirements which add largely to the cost and time without a corresponding gain. Special methods, like special material, are only warranted when their use shows a probable net gain, not alone for the immediate present but for a reasonable time in the future. In estimating on the result it is always well to bear in mind the dislike of the average man for anything "new-fangled," and the fact that such prejudice until overcome will prevent immediate realization of the efficiency and economy which may come later.

#### Labor Economy Does Not Mean Running Short-Handed

In general the economies which can be effected on the labor side are not in direct savings but instead result in the doing of more work by the same force. The tendency of most companies is towards short-handedness rather than the opposite; the payroll is always a shining mark for the axe. Clearly the ideal condition is to have just enough men in the gangs to insure that everyone will be reasonably busy all the time. On inter-urban and suburban lines this may be possible, but in the heavy service sections considerations of relations with the city as well as the cost of delay demand enough men to provide in the minimum of time for any contingency, particularly if due to fire. What constitutes the most efficient force for the purpose depends entirely upon the "local conditions" which in this instance are of the utmost importance.

In a very interesting article with a characteristic title ("Keep-Up Versus Pick-Up in Overhead Maintenance"—ELECTRIC RAILWAY JOURNAL, Aug. 4, 1917), S. L. Foster, chief electrician United Railroads of San Francisco, describes the prevention practice of his company. Mr. Foster modestly suggests that San Francisco's freedom from ice, snow, sleet and thunderstorms may account for the success of the plan, but he fails to mention the exceedingly corrosive salt fogs with which he has to contend and which nearly balance the score. Such a thorough and continuous "combing" as he describes, if applied on many of our Eastern systems, would unquestionably effect a reduction in overhead breakdown. It might not prevent a reduction in forces, particularly in the older, large cities, where the narrow and crooked streets prevent quick work with the wagons and compel a larger number of emergency crews than are necessary when the tower or repair wagon can really hustle. Advantage of this condition is sometimes taken by making the emergency crew really a wrecking crew to administer mechanical first aid to whatever goes wrong, the regular repair gangs following up if the trouble is too extensive for the emergency men to finish it themselves.

#### Watching the Repair Gang in Action

Watching a crew at work is about the best way to test the efficiency of its organization. Idle men, however, do not necessarily prove that a gang is too large. A poor arrangement of the men, of course, will overload some, while the others have little to do, a condition



"Watching a repair gang at work is the best way to test the efficiency of an organization."—Harte

showing that the foreman is not onto the job as a whole. Whether this is due to actual incompetency, the result of an endeavor of the foreman to do everything himself, or due to the use of a gang so small that he is obliged to work as one of the men, can be readily determined by watching the work for a time if a few questions do not bring out the facts.

It is true economy to have each gang so large and so well balanced that the foreman can give most of his attention to its work as a unit. If he is a good boss he will save his wages many times in the team work he can get. Further, by watching from the side lines, if he is at all ingenious, he can probably work out better methods or show why changes are inadvisable. Before any radical readjustments are made it is essential to good results that all the circumstances be understood. The fact that once or twice a gang has been working inefficiently calls for further investigation to determine

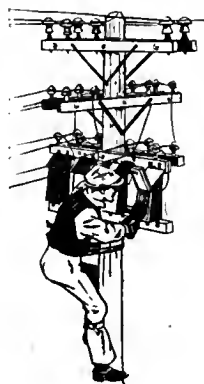


whether the trouble is chronic, and needs treatment, or whether the work at those particular times was unusual.

### The Cost of Good Tools and Appliances Is Justified by the Results

Inefficient work by a crew may be due to man-trouble or it may be the result of poor or inadequate equipment. Good tools cost money and a mistaken idea of economy sometimes leads to the purchase of too few or, worse yet, of cheap makeshifts. Poor tools are costly at best. Even in the shop, where their inefficiency and breakdowns cause only delay, and that to the particular piece being worked on, the losses are large. In line work, where delay means not merely the loss of time of the gang, but the hold-up of traffic as well, and in addition an unexpected failure of a tool is apt to cause serious injury if not death to one or more of the men, the use of anything but the best is most unwise.

In the smaller line tools have been standardized to a large extent through the long experience of telegraph and telephone practice. Even here, however, helpful minor improvements are made from time to time. In the approach and attack, however, there are marked differences both of method and of appliances.



Standardization of transmission line material tends to economy

### Power Lifts Should Be Provided on Tower Cars

The steadily increasing density of street and highway traffic is fast limiting the tower car to new construction and heavy repair work, where the track can be blocked for considerable stretches of time, and to work on open track which prevents the use of horse or auto wagon. On the other hand this limitation makes possible the use of heavy equipment with power devices, in fact, a traveling shop, the platform of which is almost as steady as the ground itself.

Power is required to raise this platform and various devices have been tried for the purpose. The use of a motor, taking current from the line permits, in conjunction with suitable clutches, its employment on winches, reeling devices and the like. An air cylinder, either in connection with an elevator-sheave-type rig, or better lifting directly, is probably the simplest arrangement. In some installations the platform has "danced" in service on account of the elasticity of the air, but the Washington Water Power Company, which has had an excellent example of this type of car in service since May, 1909, has had no such trouble, although safety chains are by this company used when the tower is to be long in service.

A combination system, having hydraulic lifting cylinders but obtaining the pressure by air fed to the top of the oil reservoir, has the rigidity of the hydraulic type and the simplicity of the air system. Straight hydraulic forms of lift require special pumps and seem particularly subject to trouble if power-operated. If hand-operated they are not enough better than the old-fashioned hand-winch rig to pay for the much higher cost.

Getting down to dollars and cents, it is difficult to measure the economy of power-operated lifts, but it is substantial. When the platform can be practically instantly shifted without effort it will naturally be adjusted to the most comfortable, which is the most efficient position, while under hand operation shifts are made only when absolutely necessary. The slowdown, and liability to slipshod work, when the men are tired from stretching or stooping, becomes quite an item if the work is at all continuous.

### Modern Power-Operated Tower Cars Have "Men Under the Hood"

The early towers were light and easily raised. Changing conditions have steadily increased the weight, and this has been largely overlooked except in the case of the cars. So long as horses were used on the wagons there was a limit to the loading possible and no opportunity for power lifts. But the advent of the auto truck put an admirable power plant just where it could be utilized readily, and where it was completely overlooked. For many purposes this power plant furnished the equivalent of several men under the hood. It is surprising, therefore, that so little has been done to get the benefit of this circumstance.

It would be a poor "bunch" of linemen who could not raise a tower by hand and then do something on the overhead. But effort and time saved for the job itself means a corresponding reduction in the time an affected district is tied up. The cost of that effort and time is small as measured by the payroll, but measured by its effect on the tie-up it is quite another matter.

So important is speed in correcting troubles in the traffic centers, and they rarely occur except at rush hours, that at least one large company uses a light hurry-up wagon carrying ladders which are used in pairs, the feet placed so that when the ladder is vertical it just clears a car. For service the tops are leaned together, forming an "A," from which the lineman can quickly descend while the two parts are held vertical to permit cars to pass. The same result is aimed for in the use of overhang platforms, but if these are built sufficiently strong to swing with the men, the movement is apt to be slow. Presently, however, some one will remember the possibilities of the auto engine and effect another time economy.

### Time-Savers Are Money-Savers as Well

The devices just described are time-savers rather than money-savers, at least directly. It is not always easy to persuade the "man higher up" that the two are the same. For this reason power winding devices, invaluable in handling feeder, are more apt to be found on systems having underground lines, where they serve as pulling rigs as well.

The economy of several types of pole-setting devices, however, is beyond question, if many poles are handled. For city work on the larger systems they are almost indispensable. The home-made gin-pole, on a truck with block-and-fall, worked by man power, shows a saving over piking. The more elaborate machines, on a property of any size, will soon pay for themselves if the time gained can be utilized. But here as in many other instances the economy which can be capitalized is often very different from the actual time saved. With



a new and well-constructed system advantage can be taken of every efficiency. As a rule, however, there are weak links which fix the size and number of repair crews, and time-saving devices, which otherwise would permit of a cut-down in force, are of value chiefly in shortening the time the crews are busy on the line.

This saving can be utilized to some extent in making up spans and brackets, cutting strand into convenient lengths, and salvaging partly used material. But with the best of management there is bound to be much lost time.

The high cost of copper, and unfortunately it is a "safe bet" that no marked reduction will be made in the immediate future, points to supplies made from it as a field where savings may be possible. Malleable iron has already proved a successful and materially cheaper substitute for bronze in frogs, crossings and mechanical ears, but whether a satisfactory iron clinch ear can be produced more cheaply than one of bronze remains to be seen.

Steel trolley wire has been employed fitfully for at least ten years, but there is almost as much uncertainty over it to-day as when the first experiments were made. Part of this is doubtless due to failure to appreciate its limitations. If the steel wire is subjected to heavy service the cost of the larger number of feed taps required equalizes the trolley wire cost. If not so fed it soon fails, as it also does in any case if there are hard spots to cause arcing. If left unprotected there is apt to be trouble from rust, not so much by weakening the wire as by streaking up the cars when rain falls.

Most of the installations of steel wire have been in solid round or grooved form, but some very interesting results have been secured in the use of common "seven-strand." In one case where there has been a total of several miles put up, largely on down grades of double-track, the chief troubles have come as the indirect result of sleet. The cars bunched and apparently started together, burning some of the strands. Whether the use of that portion of the span wires between the two trolley wires as an electrical equalizer would correct this difficulty, and if so, whether there would remain a saving, and for that matter, whether there is really any saving anyway, remains to be seen. However, as said before, the field at least holds out promise.

### Three-Wire Distribution and the Automatic Substation

Two other interesting developments have to do largely with the substation. "Three-wire" distribution, one "wire" being the rail, with sections of the trolley wire alternately positive and negative, has been discussed more or less for several years. Installations have been made both in this country and abroad. As the rail serves only as an equalizer the tendency to electrolysis is reduced. In the past the complications of the system have resulted in its discontinuance after a short use. There are, however, at least two properties (Pacific Electric Railway at Los Angeles, installed about three years ago, and Omaha & Council Bluffs Street Railway, spring of 1917), which are to-day using it. The Springfield Street Railway is also arranging a new substation for three-wire operation.

As a means of reducing high-potential gradients the change to the three-wire system is much less costly than a new substation or additional insulated negative returns. There is, however, as yet not enough evidence available to say how much of the benefit is offset by the operating complications and to the fact that the potential difference between alternate sections and corresponding parts of the switchboard is double the operating voltage.

The automatic substation finds its chief economies through the large cut-down in station labor, about 60 per cent in several instances. By distributing the capacity of one or more substations with long feeder lines among more frequent and smaller automatic stations it may also be possible to take down very considerable amounts of copper. At the same time

power losses can be cut down in addition to saving labor and current by the use of the automatic operation itself.

But what can wisely be done in any case, as regards automatic substations, as well as all other possible means of saving, cannot be safely determined by theorizing on the part of the official concerned, let alone an outsider. All circumstances bearing upon the case must be brought together and considered. The conditions of to-day, and of to-morrow, as they now appear, call for far more such consideration than has been heretofore given to this matter.

### Re-use of Line Insulators

IN the opinion of L. M. Klauber, San Diego Gas & Electric Company, companies having lines of various voltages are sometimes enabled to use old insulators on lower-voltage systems. This seldom pays, however, if the voltage steps are large, so that cumbersome insulators, subject to breakage and unnecessarily large pins, must be provided for use at the lower pressure. Some companies serving extensive territories in which a variety of service conditions are encountered find that insulators which have become inadequate in one district may be utilized for lines of similar voltage in sections where conditions are less severe. For instance, companies with lines along the seacoast may find that insulators which have proved to be inadequate under fog and spray conditions will give perfect service on the same lines in interior valleys.

On the whole, porcelain insulators, on account of their limited uses, offer a difficult problem when obsolete, and large numbers must be scrapped. It pays to have a few old types available for emergency connections and testing about any plant, for insulating stools and staging and for temporary service during construction work.

Strain insulators are more flexible devices, and if in good condition use may be found for most obsolete types. Glass "bobs," formerly used in large quantities in guys, are being abandoned for more dependable porcelain, but they will be found quite adequate for the house ends of service loops. They may also be used in the lighter types of guys, such as arm and bridle guys, and in dead-ending light secondaries. Two-bolt and small obsolete three-bolt guy chains should also be used up on these light guys.



# Savings Attainable with Present-Day Car Design

**This Article Shows How Each Element of the Car Design Affects Operating Economy Either Directly or Indirectly—Special Reference Is Made to Common-Sense Methods of Specifying and Testing Materials**

*By Norman Litchfield*

**I**N his previous article introducing the subject of car studies the writer pointed out that a car is essentially a machine tool for the production of mileage. In any study of economies that can be effected in the operation of cars on an electric railway, therefore, there are three distinct general lines along which to pursue the possibilities, the first being an increase in production of mileage through reduction of the idle hours, the second an increased efficiency in the rate of production, and the third an improved quality of the product. It is readily seen that it is impossible to obtain results along these lines without co-operation of both the transportation officials and those responsible for the care of the cars, although in the first line, namely that of production, the transportation engineer stands more alone.

## Getting More Revenue Miles from a Given Car

By the increase in production is meant the additional profitable mileage that can be produced with a given number of cars, by stimulation of travel through pleasure riding, special excursions, etc., or by other agencies which will permit the company's rolling stock to be used a greater number of hours per day than is now the case. On the average property this probably does not now exceed eight or ten hours.

This low figure, of course, is due to the fact that during the hours when people are going to and from their work there may be as many as sixty per cent more cars required than are needed during the remainder of the day, the latter number being determined largely by the interval necessary to be maintained between cars in order not to lose business. That is to say, during the middle of the day a prospective passenger will walk a reasonable distance rather than wait an undue time, or if the distance be too long to walk comfortably, he will complain either to his neighbors or to some regulating body, and if possible, withdraw his patronage altogether.

On the other hand, during the rush hour, the problem is chiefly that of transporting a maximum of passengers in a minimum of time, which often requires as many cars as can physically be operated over the tracks. This large number of cars, of course, is greatly in excess of the number required to maintain a reasonable interval in the middle of the day, and hence all operators have bent their efforts toward an increased use of these excess cars during the off hours.

By the efficiency in the rate of production is meant the increase in active mileage per car without the actual creation of new business, and the reduction of idle mileage. This phase of the subject has rather more angles

to it than that of increasing the amount of production, being more affected by details. Among the chief possibilities are the following:

The reduction of the idle or non-revenue-producing mileage through storage facilities at both ends of the line, and the short-routing of cars by a careful study of the origination and destination of travel.

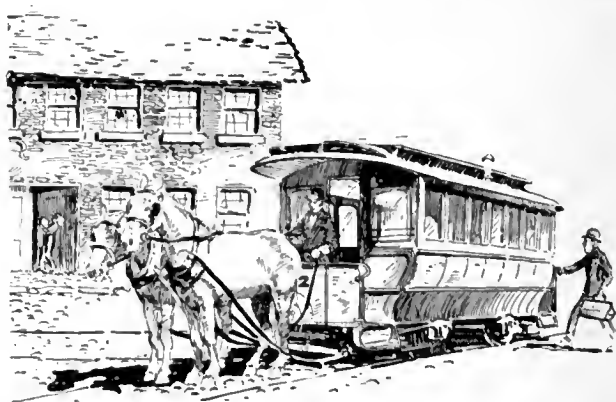
The increase of schedule speed through adoption of skip stops, higher rates of acceleration and braking, quicker interchange of passengers in loading and unloading through improvements in car design and fare collection facilities.

The reduction of platform charges through the use of one-man cars, two-car train operation, or double-deck cars.

The reduction of accident claims by providing conveniences for the motorman in the handling of his car, thus helping to prevent front-end accidents, and by improving the interchange arrangements so as to eliminate the boarding and alighting accident.

Last, but not least, the provision of all facilities possible to enable the large majority of honest conductors to obtain all the fares, and to restrain the small minority of dishonest employees from purloining fares. In this branch of the subject come also the use of devices to stimulate an increase in coasting, and of other devices and methods of saving power.

By the quality of the product is to be understood those features which tend to make the passenger satisfied, such as good lighting, heating, ventilation, and riding qualities, and freedom from delay or the discom-



The form of the platform didn't make much difference when this car was built

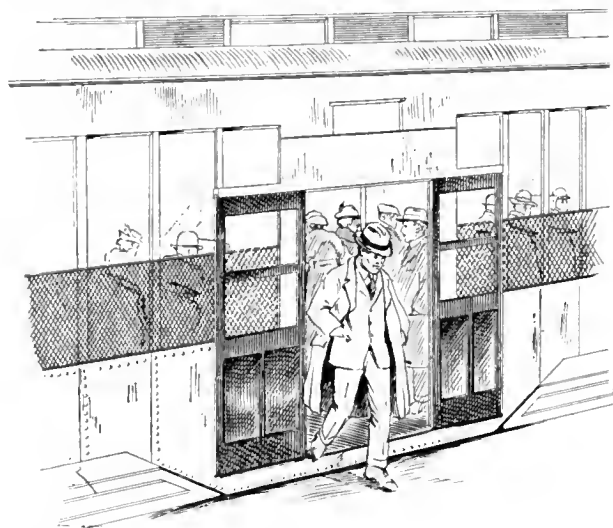
fort and exasperation induced by the request to "take the next car," due to failure of the car equipment.

As these studies have to do only with cars, we shall not dwell further on the subjects of short-routing and car storage other than to call attention in passing to the fact that an increased length of car means a larger house, and a heavier car, a stronger and more expensive building construction.

When we pass to the question of the increase in schedule speed, however, we find that the car itself becomes

a vital factor in many ways. Much attention has recently been given to the so-called skip-stop system, and special stress has been laid on the increased schedule speed and the saving in power through the reduction in the number of stops and starts. It is evident that if the number of stops is reduced more people must be handled per stop and consequently platform and fare collection arrangements must be adopted to take care of the increased number of passengers without congestion.

But in addition to this feature there enters one which



Make it as easy as possible for passengers to board and alight

has not received so much consideration, namely, the fact that in low-speed operation such as city service, the cost of car maintenance is very largely affected by the number of stops per mile.

The cost of maintenance of car equipment on a well-managed road will run from 2 to 2½ cents per car-mile. Taking an average of say eight stops per mile this would amount to a maintenance cost of about ¼ cent per stop. It cannot be claimed, of course, that the cost of maintenance increases or decreases in exact proportion to the number of stops, but on the other hand it is quite clear that if a car needed to make but one start during its whole trip, the wear and tear on the equipment would be tremendously less than under the actual conditions, where many stops per mile have to be made. Trolley poles, controllers, motors, doors, brakes, wheels and so on *ad infinitum* would bear eloquent testimony to the difference in operating conditions.

No car equipment man needs to have pointed out to him the difference in life of the same type of brake-shoe on different lines having unequal numbers of stops per mile and the humble brake-shoe may well serve as a measure of the severity of the service. Thus it is certain that the skip-stop has a marked effect on the cost of car equipment maintenance.

#### Proper Stepping of Resistors Permits High Rate of Acceleration

The possibilities through increased rates of acceleration and braking, use of proper gear ratio, and coasting devices, all have their influence on the schedule and the cost of power. They have received so much attention, however, that it seems unnecessary to dwell upon them here, further than to point out that a high average rate of acceleration can be maintained without danger of slipping the wheels and without discomfort to the pas-

sengers, provided the individual resistance steps are properly proportioned so as not to deliver a violent blow either to the passengers or to the wheels.

It must be borne in mind that any shock is the result of two things—the moving mass and the instantaneous rate of acceleration. That is to say, with an average rate or acceleration as low as 1 m.p.h.p.s. and an improperly graduated resistance, excessive instantaneous or momentary rates of acceleration are encountered—(possibly as high as 10 m.p.h.p.s.), which are exceedingly uncomfortable and which slip the wheels. On the other hand, if the resistance is properly graduated and the controller is skillfully manipulated a steady rate of 2 m.p.h.p.s. or even more can be maintained without difficulty. Similarly the rate of braking can be increased, either by an increase in the cylinder pressure or some slight change in the brake rigging so that the maximum force on the brakeshoes can be exerted which experience has shown to be desirable.

#### Making It Easy for Passengers to Board, Alight and Pay Fares

No phase of car design has perhaps received greater attention in the last few years than that of passenger interchange and fare collection, resulting in the development of a number of very interesting types of cars, and consequently in the formulation of certain fixed fundamentals. Among these are the carrying of the floor as close as possible to the ground, the reduction or elimination of steps, the provision of convenient means for operating doors, the use of fare boxes, and safety interlocks between doors and car control. All of these features contribute to the ease of operation of the car, increasing its schedule speed and reducing accidents. They are therefore classed as economies.

The one-man car, the double-deck car, and the two-car city train are in the same category in regard to economies to the extent that all are designed to provide transportation facilities of character equally as good as the more nearly standard types of car, and at a reduced platform cost. It would seem that the small one-man car of very light weight should prove increasingly popular in many classes of service, just as the two-car train is doing in others. While the double-deck car has not come into general use, it is probable that its capabilities and possibilities have not as yet been fully exhausted.

#### Passenger Comfort Features Can Be Improved at a Saving

When we come to consider the quality of the product which the car, considered as a tool, turns out, such comfort features as lighting, ventilation, heating, riding qualities, etc., would seem to be in the nature of luxuries, rather than economies. But inasmuch as they all form features of present-day car equipment that cannot be dispensed with, a little consideration will show that quite considerable economies can be effected by proper design and maintenance.

Take, for instance, the matter of lighting. The successful development of the tungsten lamp soon led to its general adoption for car lighting, and now the practical discontinuance of the manufacture of carbon lamps makes the use of the tungsten lamp imperative. It becomes important, therefore, to select very carefully the characteristics of the lamp which is to be used. The

old carbon lamp in general use was of 16 c.p., consuming about 60 watts. Where voltage conditions were reasonably good this was generally considered to provide adequate lighting.

In changing to the tungsten lamp, consideration should be given to the points on the line where low voltage occurs and to the importance of maintaining adequate lighting at these points. A question also is the amount of light which it is necessary or desirable to provide. For instance, it is generally agreed that from  $1\frac{1}{2}$  to 2 foot-candles at a plane 36 in. from the floor give adequate illumination, but if very wide fluctuations of voltage occur, and the lighting is designed to give  $1\frac{1}{2}$  foot-candles at the lowest point, then at the high-voltage points a very much greater degree of illumination is obtained. As the life of the tungsten lamp falls off very rapidly with increases in voltage, it is important that a lamp of proper characteristics be selected, so that a reasonable life will be obtained.

The photometric determination of illumination in a car is very simply made, and a check-up of this kind will often point the way to considerable operating economies. A step further, and one which in many cases is desirable, is to purchase the lamps to a specification requiring certain tests to be made in the presence of an inspector. Study of the operating and manufacturing conditions will finally dictate the selection of a lamp which will have the most desirable balance of life, power consumption and illumination.

A further point is that considerable increase in illumination can be obtained by a change in the color of the ceiling. These points, it is to be noted, are exclusive of any change in the arrangement of the lamps or of addition of reflectors, all of which may involve alterations to an extent not always justified.

With regard to heaters the most obvious possibility of economy is in some method of operation whereby no more than sufficient heat will be provided. Much can be done by proper co-operation with the transportation officials in the issuance of orders for the use of the heaters and the control of the doors, especially in cars

how much heat is lost through opening doors, ventilation, etc.

Thermostatic regulators are also now receiving some attention, but inasmuch as they require an extra investment and add a hazard or element of failure and possible complaint, it is well to make a careful study of the actual total amount of heat used for power in an average year, and the actual amount of excess heat that is supplied by the existing graduations of heat control by the ordinary switches. These data, together with the cost of power (coal and water only if the company manufactures its own power) will give an indication as to whether regulators will prove desirable or not.

The conclusion will be influenced by the relation between the total numbers of cars owned and of car-hours operated. That is, sufficient regulators must be purchased to equip all cars, whereas only a certain proportion of these cars will be used enough hours each day to make the current saving profitable. The matter is also further influenced by the character of the climate, frequency of stops, kind of service, etc., so that it is essentially one in which the existing local conditions must be carefully studied. In studying this question it



Keep the cars out on the line—  
run-ins are expensive

should be understood that the difference between the power used in winter and that used in summer does not necessarily represent the heater load, as in winter season, more passengers are often carried, more stops are made per mile, vehicular congestion is greater, etc., these items sometimes in themselves causing a large increase of energy used per car-mile.

### Heavy Trucks Not Essential to Easy Riding

Good riding qualities in a car are naturally desirable and are often thought to be obtainable only at the expense of excessive weight. It is very questionable whether even very high speeds require weight, in itself, to produce ease of riding, and it is certain that ordinary speeds, say up to 45 m.p.h., do not. The essentials are chiefly a proper side-swing motion adequately damped against excessive lurching, sufficient side-bearing and pedestal clearance, and correctly designed springs. Inasmuch as the cost of each additional pound has been estimated by various authorities to amount to as much as 5 cents per pound per year, it is evident that it is exceedingly wasteful to apply weight to a car simply with a view to improving its riding qualities, when this result can be accomplished otherwise. Instances have been met where it was possible by careful redesign to eliminate as much as 8000 lb. per car. For each lot of 100 cars this would amount therefore to \$40,000 per year, a very substantial saving.

In the elimination or reduction of run-ins caused by car equipment failures we strike a mine whose depths



Facility of passenger interchange is an essential  
of quick transportation

having end doors. A simple test of heating any car to a given point, then turning off the heat and recording the temperature, say, every minute, with the car standing still, and then repeating the test with the car in actual service, will prove very instructive. It will show



cannot be plumbed in the limits of such an article as this. There are, however, certain outstanding features to which attention may be called, the chief of which is the constant recording and analyzing of recurrent failures.

From the analysis comes the knowledge making possible the redesign of the offending part, or the formula-



Some people are naturally in a hurry—Utilize this trait by providing suitable entrances and exits

tion or adoption of a specification or practice which will prevent the repetition of the failure. The word "specification" should be taken in its broadest sense, not necessarily a detailed statement, but possibly simply the adoption of some one make of article which has proved satisfactory. The chief thing is not to keep on replacing the very thing which has proved a failure.

Instances of the above will immediately suggest themselves to all familiar with car equipment, one of the most striking being that of gearing, where improvements in materials and their proper selection for the service have resulted in an increase in life from a former figure of 50,000 miles to one of more than 200,000 miles.

#### Each Road Needs at Least One Defect Analyst

Two questions naturally arise for the average road, one being how to make use of the scientific knowledge available from different sources, the other how much use should be made of specifications and inspection services. Should each road have its own force, however small, for the scientific analysis of problems, should it go for information to other and larger roads, or is it desirable to employ outside consulting engineers? Similarly, should the road attempt to inspect its own materials, or employ the services of inspection bureaus? This is a problem which can, of course, be settled only by each individual management. Roughly speaking, it may be said that in each organization the attempt should be made to include at least one man whose duty shall be to attend to the recording and analysis of failures and to keep in touch with those roads and engineering associations which are developing or recording methods and materials which have proved satisfactory.

As to detailed specifications, their uses are twofold: first, to insure obtaining the material desired, and second, to yield the advantages of competition which could not be made use of if but one definite make of material were named to the exclusion of all others.

In connection with both of these points, however, two things must be borne in mind. The first and more important of these is that if the user does not understand the specification it will often be wiser for him not to use it at all but depend rather on the word and experience of some reputable manufacturer. It is self-evident that no specification, however carefully drawn, can supply a lack of experience or integrity on the part of the manufacturer. There are extant a number of specifica-

tions which are a "hodge podge" of extracts from various originals combined by inexpert hands into a heterogeneous mess. The various provisions of these are absolutely contradictory, and hence make them the laughing stock of reputable manufacturers and tend to make the latter "gun-shy" of any specification not prepared by themselves. Faulty specifications, and their incorrect use, therefore, do not tend to economy.

The second point has to do with inspection of materials. Here an attempt should be made to analyze requirements so as to determine fully just what materials are most vital to have properly inspected and tested, and what others can be purchased from ordinary merchantable stock, for the tendency in inspection, as in many other things, is to degenerate into red tape. Such inspection as can conveniently be made by the company's own employees should be so handled, and the balance should be turned over to reliable inspection bureaus.

#### Don't Hesitate to Conduct Tests and Inspections

Conditions vary considerably with the size of the property and its local situation, but the following would seem to be a reasonable procedure in connection with miscellaneous materials. Taking first the materials themselves, the chief supplies used for car equipment are gray iron and malleable iron castings, bar iron, steel shapes and plates, steel castings, copper cable, insulating materials, brass castings, bar copper and lumber.

Cast iron, being generally used in places where there is little tensile or bending stress, will usually be found satisfactory provided it is of good, soft, gray quality. This is easily ascertained by fracture. So with malleable iron, which is used in places where some degree of flexibility is necessary, the quality of the product can gen-



Heater regulation will avoid this

erally be determined by bending. When it comes to bar iron and steel, we enter the region wherein it may be well to resort to more elaborate tests. But here again the engineer need not sacrifice his judgment to the fetish that "everything must be tested."

If the material is for a piece the failure of which does not affect safety, and little trouble has been experienced with the part, ordinary stock material may be used at less cost than if rigid specification were required.

To insure reasonably good open-hearth steel, two simple tests can be made. In one the piece is bent cold around a 1-in. radius, and in the other a chemical determination of the percentage of phosphorus which it contains is made. The phosphorus content should not exceed 0.07 per cent. As the importance of the piece grows the specifications may be made more complete until the full tests required in the standard specifi-



# Betterments Available in Car Equipment

Why and Where It Will Pay to Use the Newer Motors and Control, Large - Unit Lighting, Thermostatic Regulation, Car Checking Devices, Etc.

By C. W. Squier

Electrical Engineer.

THE spirit of the day is "economy" and "efficiency." Never before in our history have these two essentials been so impressed upon us. We have learned to retrench in fuel, food and all things connected with our daily needs as individuals, and we are learning to make what we have do twice the work we previously expected it would perform.

The cost of transportation is subject to the same rules as the cost of other commodities. Its cost of production must be restricted and reduced, and our car equipment so readjusted and operated that increased efficiency will result. In the past great strides have been made in rendering better service with lower costs of operation. Now any methods by which the capacities of our transportation system can be increased or their costs of operation reduced are of paramount importance.

Up to approximately five years ago safety and reliability in electric-car equipments were considered the first requisites. Heavy construction was considered necessary in order to meet the extremely trying operat-

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cations are made. The above often holds also for steel castings, as in many cases a piece has only to withstand stresses which are but slightly in excess of these which could be met by the use of cast iron.

The copper parts and insulating materials are very generally put to use where safety and durability are prime features and hence should receive the maximum degree of care in selection that the user feels justified in applying. As the manufacturers are fitted to make the necessary tests at their own plants it is comparatively simple to have an inspector witness the necessary tests.

The requirements for lumber on the average car are not severe enough to necessitate elaborate tests, simple inspection being usually sufficient. Completely fabricated parts of special nature such as gearing, brushes, lamps, brakeshoes, buses, etc., can be effectively checked up as to their relative cost and efficiency by simple tests in the shops, and by recording the life and the mileage, at a cost the sum total of which is insignificant compared with the possible economy.

In all these matters it should be borne in mind that there are "acid tests" of the desirability of any specification or requirement. Will it make the article (1) safe, (2) more durable, (3) cheaper? The purchaser must be convinced that every requirement of the specification tends to one or more of these ends, and if he cannot be so convinced, it is often better to omit the requirement.

ing conditions of railway service and to decrease the troubles of operation and the resulting maintenance costs. The life of all wearing parts was increased and operating engineers bent all their energies toward keeping maintenance costs as low as possible. As the limit in this direction was approached the fertile mind of railway engineers cast about for some other means of reducing costs of operation. Saving power appeared to offer the largest field for economy, as this constituted one of the largest operating cost items.

A demand for the reduction in weight of all car and equipment parts was the first that occupied attention. Articles were written by many engineers who figured the costs resulting from carrying around the dead weight of the car and its equipment. These figures varied from 3 to 10 cents per pound per year as the conditions and service varied. The results were, however, that all manufacturers of railway equipment were forced to redesign their apparatus. By the use of high-grade metals, pressed-steel shapes and better insulation, the weight was reduced and at the same time other vital characteristics received careful study to reduce power consumption wherever possible. The results that have been obtained are astonishing and the limit has not yet been reached.

Let us consider the various groups of apparatus comprising a car equipment and see what improvements have been made that are conducive to energy and labor saving.

## Making Better and Lighter Motors

As the motors are used for propelling the cars we naturally expect to find the greatest saving in energy through improvement in their design.

The saving in power, the greater electrical efficiency produced and the decreases effected in maintenance costs have resulted primarily from the following improvements:

1. Better mechanical and electrical construction.
2. More efficient methods of lubrication.
3. Slotted commutators and high-grade brushes.
4. Interpole field windings.
5. Self and forced ventilation.
6. Reduction in weight.
7. Higher grade insulation.
8. Choice of correct gear ratio.
9. Lower armature speed.
10. Tapped field windings.

After the experimental and early development stages of railway motor construction had passed, there followed the period, already referred to, when the energies of railway engineers were directed toward reliability and increased life in operation. This resulted in the development of the magnificent motor equipments that are now found on our electric roads.

The first two groups of improvements enumerated above belong to this period and need not be described here, as they are a matter of history which has been fully treated in many articles in the *ELECTRIC RAILWAY JOURNAL* and elsewhere.

### Present 1500-Volt Motors Less Troublesome Than Old 500-Volt Types

The development of the interpole or commutating-pole motors was brought about in an endeavor to reduce operating troubles and maintenance costs. This design was introduced and perfected during the period from 1907 to 1911. Previously one of the greatest troubles with direct-current motors was in commutation. The introduction of commutating poles, together with undercutting the mica of commutators and the use of high-grade carbon brushes which occurred about the same time, overcame this last serious objection.

Those who have had experience with older types of motors, especially before these improvements were adopted, will remember the frequency with which the commutators ran black and developed flat spots. The lathes in the maintenance and overhauling shops were kept in constant use turning down and sandpapering commutators. As a result commutator wear was very rapid and it was necessary for manufacturers to make the segments very deep to provide for this wear. Now the wear of commutators is so slight that it can hardly be detected after a year of service, and the depth of segments is made only sufficient for proper insulation and mechanical strength. The wear of the brushes was also very rapid, due to the excessive sparking at the commutator, and it was necessary also to use a brush with high abrasive properties to cut the mica. With the slotting of commutators hard brushes were no longer necessary and brushes with greater conductivity came into general use.

Another great advantage that has resulted from these improvements is in the use of higher voltage circuits, which has increased reliability of service. Now motors are made to operate on 1500 volts and have less commutator trouble and operate better than did the old motors on 500 volts.

The principal saving that has resulted from these improvements is in the reduced maintenance and repair costs which have been given by some reliable authorities as from 50 to 75 per cent. These improvements have also made possible the carrying of heavy overloads on the motors, permitting higher rates of acceleration and therefore more economical operation. They have also made possible the use of field control with its resulting economy.

The first railway motor did not have an enclosing frame. All parts were exposed and consequently well ventilated. Vital parts were easily damaged, however, and due to the exposed location of the motors it was found necessary to inclose all parts by the frame. This

added greatly to the reliability of the motor, but prevented proper ventilation.

As service conditions grew more severe it became evident that much could be gained by ventilating the interior parts and forcing air through the windings. The first step in this direction was to ventilate the armature and depend on its fan effect to keep the air circulating. This was a step in the right direction, but all heat had still to pass through the frame by conduction. By providing openings in the frame and additional ducts and channels in both frame and armature the present ventilated motor has been developed.

The various stages in the development in motor ventilation were shown very clearly by a series of diagrams in the *ELECTRIC RAILWAY JOURNAL* of May 15, 1915. On some locomotives air is forced through the motors by motor-driven blowers, but the construction most used provides a fan on the armature which draws air in and

drives it through the armature and fields and by shields and ducts deflects it and again expels it to the outside of the motor. The effect that this has in reducing the temperature and increasing the capacity of the motors is simply tremendous, and it has resulted in increasing the continuous capacity of motors, which ordinarily is not more than 45 to 50 per cent of the one-hour rating, to 65 to 80 per cent of this rating.

The benefit that can be derived from self-ventilation depends upon the schedule speed that is to be maintained and the gear ratio used, since the amount of ventilation obtained is a function of the armature speed rather than the car speed. Thus in city service much

of the operation is at low speed, with the fan practically inactive, and the benefit derived will be comparatively small. In high-speed interurban service, with long runs, great benefit is obtained. With a separate blower for circulating the air the ventilation is, of course, independent of the speed.

### Motor Weight Reduction Alone Can Save \$42 per Car per Annum

The weight of motors has been reduced by careful designing and proper proportioning of parts so as to eliminate all useless material. High-grade metals have been used to a greater degree, and many parts formerly made of cast iron are now made of malleable iron or steel. Great improvements have been accomplished in making these steel castings so as to permit the use of thinner sections than had been possible to cast theretofore. This has reduced the amount of useless material and resulted in a corresponding saving in weight.

Pressed-steel shapes have been used more extensively also, and heat treating of steel has been perfected to bring about other savings in weight. These improvements, together with the latest ventilating practice have resulted in a saving of from 15 to 40 per cent in weight, as compared with the old-style, totally-inclosed motor. The exact percentage depends upon the commercial sizes and speeds available.



The conductor has a lot to think about—  
Make his labors as light as possible

To take a concrete example, suppose we consider a two-motor equipment with old motors weighing 2700 lb. each replaced by motors weighing 2000 lb. each. This gives a saving in weight of 1400 lb. per car. At an assumed operating cost of 3 cents per pound per year there would result an annual saving of \$42 per car per year. Now consider a road that is in the market for 200 new equipments. The reduction in the weight of the motors which this road could now purchase will represent a saving of \$8400 per year.

#### Better Insulation Is Equivalent to Increase of Motor Capacity

By employing a higher grade of insulation, with greater heat-resisting qualities, the capacity of motors has been increased through the raising of the safe temperature limit.

Soldering material with a higher melting point has also been used. This is important since heavy and sudden overloads of such short duration that they do not



Better lubrication is a factor in conservation

cause excessive heating of the armature coils, often last long enough to melt the soldered connections or to cause them to soften sufficiently to permit the solder to be thrown out by centrifugal action.

This increase in the capacity of motors will enable a lighter motor to be used for a given service and also will permit a higher rate of acceleration in operation, thus reducing the average power consumed.

#### Re-Gearing Costs Less Than 5 to 10 per Cent Power Waste

The use of incorrect gear ratios for railway motor equipments has caused great losses to operating companies. Gearing that was suitable for operating conditions when the motor equipments were purchased will likely prove unsuitable as the service becomes more exacting. When we consider that in city and suburban service a majority of the work done by the motors is at speeds less than 10 m. p. h., we begin to realize how important it is to be able to accelerate rapidly.

In checking over the service conditions of a large railway system operating city and suburban service, I find that 37 per cent of the total mileage made is in congested sections where a schedule speed of 7 m. p. h. is as high as can be obtained. Thirty-eight per cent of the mileage is in sections where from 8 to 9 m. p. h. is the highest speed practicable, and only the remaining 25 per cent is in sections where the cars can maintain a schedule speed of more than 10 m. p. h. The maximum speed for such sections is less than 11 1-2 m. p. h. It is thus seen that the period during which cars can operate at maximum speed is very short, and a grave error is made by providing gearing for high speed when there is no opportunity to obtain it. A typical cycle for

such service is rapid acceleration, short coasting period and rapid braking. Consequently the most efficient operation is with the lowest-speed gearing that will give the required schedule speed, with a reasonable margin for congested conditions and the making up of lost time.

Few outside of those who have made a special study of this question realize its importance and at the present time there are a great many motors operating in service which are so geared as to cause a continual loss to the operating company. Without doubt 5 to 10 per cent of all the power used for propelling electric cars and trains could be saved by the use of correct gearing.

In order that a motor may be economical in power consumption it must have a low armature speed, with as high a gear ratio as the service will permit. In comparing the power consumption of two motors, with the same gear ratio but different armature speeds, the one with the armature of lower speed will show a decreased power consumption in one of the following two ways, namely, it can produce the same rate of acceleration with less current, or with the same current it will give a higher rate of acceleration.

This saving will be found much more pronounced in a service with frequent stops. In comparing two equipments in a city service with nine stops per mile and a schedule speed of 9.2 m.p.h., it was found that the slow-speed motor used 0.46 kw.-hr. per car-mile less than the high-speed motor, or a saving of 10.9 per cent in its favor. This was due to the more rapid acceleration of the car with the slow-speed motor, so that the accelerating current did not continue so long, and with the same amount of coasting the brakes were applied at a lower speed. Part of this saving is, therefore, due to lower rheostatic losses and the remainder to the smaller amount of stored energy wasted in braking.

#### How Field Control Saves \$100 per 35,000 Miles

The first designs of double-reduction motors provided for controlling their speed by varying the effective turns in the field winding. This was known as the "loop" system and was quite familiar on our first electric roads. This method of speed control proved a failure at that time, due principally to the difficulties encountered in commutation as the fields were weakened.

Improvements in motor design, together with the use of interpole field windings, slotted commutators and high-grade carbon brushes, so improved commutation that railway motor designers have again taken up this method of control, with surprising success. The first method of field control consisted of shunting portions of the field windings through a resistance. The latest method differs from this in that, instead of shunting the field, approximately 40 per cent of the full field winding is cut out. The advantages gained by this latter method are that the use of a non-inductive shunt around the field is avoided. This, with solid-frame motors, produced flashing.

Let us consider how a tapped-field motor saves power, and what saving can be expected by the use of tap-field control. This saving in power is the result of more efficient acceleration. By comparing the characteristic curves of the motors, one a slow-speed motor without field control and the other the corresponding motor with field control, we find that the speed of the field-control motor, when operating on normal or tapped

field is about the same as that of the other motor, while the speed of the field control motor when operating with full field is much lower.

In accelerating the full field is used and the rheostatic losses will be less, as the grid resistors have less resistance and are not in circuit for as long as is necessary when using a motor without field control. The tapped field is used for running, so that the same speed is obtained as with the non-field-control motor and the braking losses remain the same. A further advantage is also obtained by use of the field-control motors when the same car is required to operate in service of different character. Thus for combined city and suburban service field control provides more economical operation over the slow-speed city sections in that it permits the use of a gear ratio most economical for this service, and with the same gear ratio provides the higher speed necessary for suburban service.

As an illustration of the saving that may be expected from the use of tapped-field motors consider a two-motor equipment where the tractive effort per motor necessary to produce the desired acceleration is 2000 lb. The relative values of current necessary to give this tractive effort are 83 amp. with the non-field-control motor as compared with 76 amp. with field control, and the corresponding rheostatic losses are 1.4 watt-hr. per ton as against 0.7 watt-hr. with field control. The tapped-field motor, then, saves 0.7 watt-hr. per ton every time the car starts. With a car weighing 30 tons and making eight stops per mile the saving in rheostatic losses alone will amount to 0.168 kw.-hr. per car-mile. The total saving from employing field-control motors in the service will amount to 0.38 kw.-hr. per car-mile. Considering that energy costs  $\frac{3}{4}$  cent per kilowatt-hour at the car, and assuming that the car makes 35,000 miles per year, this saving would amount to approximately \$100 per car per year.

#### Concentrating Control Saves Weight, Wire and Conduit

At the same time that new motors were being developed, the old ones were receiving much attention from operating engineers and master mechanics with a view to cutting down maintenance costs. Wonders have been performed in this field, and now it is essential as never before to introduce still further economies if profits are to be made by the average road.

The design of railway control apparatus has kept pace with the improvements in motor construction and many operating economies have been made possible by the advance made in control equipments. The following are some of the improvements in control that have aided in producing high service efficiency and operating economies:

1. Simplicity of construction.
2. Greater reliability.
3. Consolidation of parts into single units.
4. Reduced weight.
5. Improved materials.
6. Automatic acceleration.
7. Selective acceleration.
8. More efficient use of resistance.
9. Arrangement for field control.

One of the most notable advances has been the tendency to seek simplicity and reliability and to combine various small pieces of apparatus into larger units. In

the equipment for surface cars a return has been made to more general use of the shunting method of transition from series to parallel, instead of using the bridging feature, which required a greater number of contacts or switches. These changes are producing lower maintenance costs and reduced cost for replacement parts.

The combining of various pieces of control apparatus and assembling them in a single box, which applies particularly to switch-group control, simplifies the control connections, reduces the labor and time of inspection and provides a lighter equipment.

#### Switch Group of World's Biggest Rapid-Transit Car Weighs Only 900 lb.

The effort to reduce weight has not been confined to car bodies, trucks and motors, but has been extended to control equipment in a marked degree. The consolidation of various parts comprising an equipment into single units, just referred to, has produced astonishing



Skill in the selection of gearing conduces to economy

results in weight reduction. In the control equipments used by the New York Municipal Railway on their new subway cars, the switch group which is designed to handle two 200-hp. motors weighs but 900 lb., scarcely more than half the weight of the former control outfit of similar capacity.

By combining all the main-circuit apparatus in a single box a further reduction in weight has resulted, due to the decrease in the amount of cable and conduit required and in the labor and consequent cost of installation.

Another marked saving in weight has been effected by a special design of grid resistor, whereby the weight of a set has been reduced approximately 40 per cent without loss in continuous capacity.

Not only has the weight of resistors for a given capacity been decreased by better ventilation and increased radiation, but control connections, also, have been rearranged so that the same section of resistance is used several times in increasing the voltage on the motors, by using it in series and again in parallel with other sections. Previously when a section was cut out it remained inactive during the remainder of the period of acceleration. This improvement gives a more efficient use of the resistors.

#### Smaller Control Accelerates Passenger Interchange

A large part of the equipments now being supplied are of the switch-group or multiple-unit type of control. Some of the many advantages possessed by this type of control are:

1. Better location of apparatus.
2. Less platform space occupied.
3. Less liability of accident.
4. Greater flexibility for operation.
5. Decreased maintenance.
6. Automatic acceleration.

The removal of the controller from the platform is important because the greater the space that can be used for boarding and alighting the less will be the resulting congestion and the shorter will be the stops. This produces a saving in time that is at once apparent in the increase that results in schedule speed, while the saving in platform wages and passenger time is well worth considering.

This effect of the length of stop on operating results and costs is very clearly illustrated in the article by J. F. Layng in the *ELECTRIC RAILWAY JOURNAL* for Jan. 5, 1918. This shows an increase of one-third in the cost of platform wages alone by increasing the duration of stop from five to fifteen seconds with nine stops per mile.

The removing of the main circuit apparatus from the car platform reduces the liability of accidents from controller explosions and burnouts, with consequent reduction in accident damage suits.

#### Automatic Acceleration Promotes Faster Schedules

Another great saving is possessed by switch-group control arranged for automatic acceleration in that it eliminates the energy waste in the first or accelerating part of the operating cycle by removing the personal element in operation.

Designing engineers make very careful calculations for the values of the various resistance steps in order to obtain smooth acceleration and prevent abnormal current peaks. They assume a certain definite rate of notching for cutting out these resistance steps. With hand-operated controllers this is seldom obtained.

The effect that the rate of notching has on current values and power consumption is very clearly shown by the curves given in my article on "Resistance Standards" in the issue of the *ELECTRIC RAILWAY JOURNAL* for May 11, 1912. A saving of from 5 to 7 per cent in the total power used could be obtained on most roads if the controllers were operated according to the methods assumed in the design of the apparatus. Automatic acceleration does away with the personal element and assures the engineer that the equipment will be operated as desired.

Another saving with automatic acceleration is in obtaining at all times the maximum rate of acceleration for which the equipment is designed. It is frequently found that where a line is operating under a fairly easy schedule the motorman will accelerate slowly and, no doubt, operate with the motors in series a large part of the time. A study of the energy required for different rates of acceleration is very interesting. With a specific equipment operating in city service the following results were obtained:

Rate of Acceleration M.p.h.p.s.	Watt-Hours per Ton Mile	Per Cent Saving from $\frac{3}{4}$ m.p.h.p.s.
$\frac{3}{4}$	110	
1	90	18.2
$1\frac{1}{4}$	83	24.5
$1\frac{1}{2}$	78	28.2
2	76	30.9

The difference in energy saving is considerably less between the high rates of acceleration than it is between the low rates. Thus the difference between accelerating at  $1\frac{1}{2}$  and 2 m.p.h.p.s. is only 2.7 per cent, while between  $\frac{3}{4}$  and  $1\frac{1}{4}$  m.p.h.p.s. it is 24.5 per cent.

#### Selective Acceleration Is Another Refinement

In order to obtain the same rate of acceleration for all loads between maximum and minimum, what has been termed selective acceleration has been developed. On the subway cars of the New York Municipal Railway this is accomplished by having two windings on the limit switch. One coil is in series with the main motor circuit, while the other is wound so as to oppose the first and is connected to a storage battery through a variable resistance. This resistance is cut out automatically as the load on the car increases, so that it will take more current through the series winding to counteract the current in the battery circuit and therefore to cause the "limit" to operate.

This feature not only produces economy at the car but permits trains to get away from stations faster and makes them respond more rapidly at signals, thereby increasing the capacity of the road.

Another great advantage accomplished by this improvement is in connection with field control. In changing from full to short field with tapped-field motors there is a sudden increase in current. This current swing mounts very rapidly as the lower current value, from which the change is made, is increased. Thus if the change from full to tapped field is made at 200 amp. the current will increase to 340 amp., and if it is made at 275 amp. it would swing to 450 amp. By the use of the double winding on the limit switch, just described, this change is always made at the lowest setting of the limit switch, which is 200 amp., and this current swing is constant and moderate.

#### Faster Braking Results in Energy Saving

Time saved while stopping a train is just as valuable as time saved during any other part of the operating cycle. Improvements in air brakes have made it possible to use a higher rate of retardation for stopping and also they have reduced the time necessary to apply the brakes so as materially to reduce the stopping distance and time necessary for bringing a train to rest.

Conditions remaining the same, any increase in the braking rate produces a decrease in power consumption, since the car or train can be allowed to coast longer and the brakes can be applied at a lower speed. Thus less of the stored energy of the car will be consumed during the braking period. This saving is shown directly in the decreased time that power must be used in order to maintain the required schedule speed.

#### Electro-Pneumatic Brakes Stop a Train in 330 ft. Instead of 580 ft.

By using electricity to actuate the air valves of the compressed air brake, the following advantages have been obtained:

1. The difference in time, at which brakes are applied on the front and rear cars of a train is eliminated.
2. The probability of rough handling is reduced.
3. The difference in time, between the movement



of the brake valve and the application of the brakes is reduced.

4. Brake-cylinder pressure and the resulting retarding force is developed more rapidly.

5. Higher rates of retardation can be employed.

6. The limits in the length of trains are removed.

The largest saving that has been accomplished by the use of electro-pneumatic brakes has been obtained by increasing the braking rate. Previously it was not possible to use a rate of retardation anywhere near approaching the holding power between the wheels and the rail. This was due to the fact that in applying the brakes pneumatically the application began first at the front end of the train, and this interval between brake application at the front and rear prevented using the maximum rate of retardation at the front end or shocks would occur so severe as to damage the car equipment and be injurious to passengers. By the use of the electro-pneumatic features a rate of initial retardation has been made possible at least ten times that formerly used without damage or inconvenience, since the brakes are applied on the rear of the train at nearly the same instant as at the front.

It is also practicable to use a maximum rate of retardation approaching very closely to the holding power of the rail. Compared on this basis, brakes applied electro-pneumatically will give 100 lb. brake cylinder pressure in two seconds, with a braking ratio of 150 per cent, and will stop a train from 40 m.p.h. in 330 ft., while when applied pneumatically they produced 60 lb. cylinder pressure in 6.6 seconds, a braking ratio of 120 per cent and at 40 m.p.h. required 580 ft. to stop the train. A saving in distance of 250 ft. is obtained in this instance by the use of electro-pneumatic brakes. This means a great deal on lines where it is necessary to operate to the full capacity of the tracks, as the length of the blocks used in signaling depends on the distance that is necessary to bring a train to a stop. With shorter blocks trains can follow each other more closely and so the capacity of the line is increased.

The stopping distance with the pneumatic brake will increase as the length of train is increased, while that with the electro-pneumatic brake is independent of train length. The length of train that can be operated is thus limited by the use of the pneumatic brake while with electro-pneumatic brakes any length trains are feasible as far as the brakes are concerned.

The value of increased braking rates on electric cars or trains makes itself manifest in a decreased power consumption if the same schedule speed is maintained or in an increase in schedule speed with the same power consumption. This follows since, with the same schedule speed, an increased rate of retardation will allow an additional amount of coasting and enable current to be cut off the motors sooner. The energy saved in average city service by increasing the rate of retardation from 1 to 1½ and 2 m.p.h.p.s. will average about 8 and 11 per cent respectively.

Since a high rate of retardation produces the greatest economy it is desirable to maintain the maximum rate

with a loaded car or train as well as with a light one. A braking power sufficient for a light car is inadequate for one loaded, and if the braking power is designed so as to use the adhesion of the loaded car it would obviously produce sliding wheels when the car is empty. The variable-load brake, which has had its first installation in passenger service on the cars of the New York Municipal Railway, fulfills this requirement.

On these cars a full passenger load represents 45 per cent of the light weight of the car. The increase in train weight if the same braking pressure were used would mean practically a proportional increase in braking distance. It will be readily appreciated that the improvement prevents a serious waste of time and decreases the distance between trains at limiting points so as to increase the capacity of the lines.

Briefly, this automatically provides an increase in brake-cylinder pressure as the load increases, by increasing the volume of the auxiliary reservoir.

This change in reservoir capacity is accomplished by the use of an additional reservoir divided into compartments of various sizes, and connected to the auxiliary and supplementary reservoirs through ports controlled by a slide valve. The movement and position of this slide valve is automatically adjusted by the variations in weight on the truck springs due to changes in passenger load. An accurate adjustment

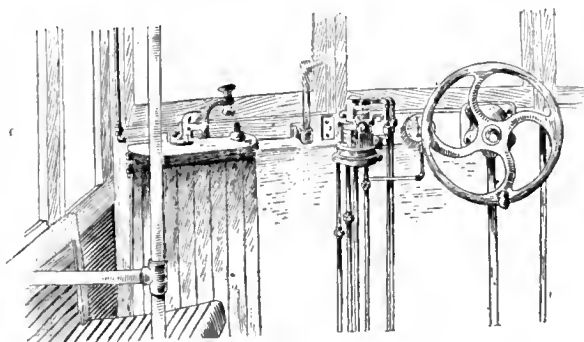
of braking power in ratio to load is thus obtained.

In some tests made under operating conditions with a view to determining what saving was effected by the use of this improvement in stopping loaded trains, it was found, with the brake-cylinder pressure adjusted to give the maximum safe rate of retardation for a light train, that in making a stop with a fully loaded train from 40 m.p.h. an additional five seconds per stop and an average of 150 ft. in stopping distance was required over that obtained with the empty-and-load device supplying a brake cylinder pressure in proportion to the load. This means that with a brake adjustment and pressure for producing an average rate of retardation of 2 m.p.h.p.s. with a light train, there would be obtained but 1.6 m.p.h.p.s. with a fully loaded train. By the use of the empty-and-load brake device 2 m.p.h.p.s. could be obtained.

This device also improves operation in that a motorman can judge his stopping distance more accurately, for the stopping distance with the same reduction in train line pressure will be nearly constant while otherwise motormen frequently have to make a second reduction and sometimes an emergency application.

#### Slack Adjusters for Safe Saving—Automatic Couplers for Quick Train Make-Up

Slack adjusters also decrease power consumption. In making an application of the brakes, the first movement of the brake-cylinder piston takes up the slack in the brake rigging and brings the brake shoes in contact with the wheels. The more slack there is in the brake rigging the greater is the distance that the piston will have to travel before braking pressure is



These are the tools that the motorman works with.  
Give him the best

applied to the wheels, and the greater will be the volume of air used in applying the brakes. By taking up any excessive slack in the brake rigging the slack adjuster aids in giving more efficient braking. Slack adjusters also lengthen the period between brake adjustments.

The most important recent developments in coupler design include provision for automatically making the air and electrical connections between cars as well as providing the mechanical coupling of the cars. These improvements effect a great saving in time in adding and cutting off cars and they also do away with the extra men formerly necessary to assist the motorman in making these connections. Accidents are also reduced to a minimum. Automatic couplers also make it easy to add and cut off cars at

points before the end of the line is reached, so that trains of maximum length can be operated through the congested service sections and then cars can be cut off and the remainder of the run made with just enough cars to take care of the service requirements.

#### Pneumatic Door and Step Control— Better Lighting with Large Units

With power operation of doors and steps, many advantages have been made use of to reduce costs that were not considered at first. These include:

1. Reduced number of accidents.
2. Shorter duration of stops.
3. Better car heating.
4. The use of labor more suitable for personal contact with the traveling public.

When the rear platforms of earlier cars were open no door-operating mechanism was necessary, but with the introduction of closed vestibules on cars it became evident that the value of such cars would be greatly increased by a faster operation of door and step mechanisms. The earning power and attractiveness of a car are also greatly increased by the use of automatic equipment.

The hard service which manual door operation requires of a conductor can be appreciated from the fact that on some lines a round trip requires opening and closing the doors as many as 200 times. Is it any wonder then that with hand-operated doors the conductor slows up his operation after a few trips?

I have already discussed the advantage in power saving that is gained by keeping the stops as short as possible. There is an additional advantage obtained by closing the doors quickly in the saving of heat in cold weather. In addition to these savings in time and labor, power operation of doors and steps permits the use of a different class of platform labor and assists in obtaining it more readily, as the duties are made more attractive and desirable. Labor with greater mental capacity rather than physical agility can be used, and as the duties require close and continual contact with the traveling public better relations are fostered and complaints are reduced in number.

The changes and improvements that have been made in car lighting have resulted not only in better lighting but in cheaper lighting as well. The lamps in use on



Better braking results in energy saving

cars on nearly all the lines today are of the improved tungsten-filament type. Up to approximately five years ago the carbon-filament lamp was in general use. Due to the fact that nearly all roads using direct current arrange their lamps in circuits of five lamps in series, and as these circuits are subjected to a considerable fluctuation in voltage, the carbon lamps used were burned at low efficiency. Tungsten-filament lamps outclass carbon lamps in efficiency and in the color of the light produced and, with the improvements in manufacture that have been made, they now give as long life as the carbon lamps.

The first use of tungsten-filament lamps was in replacing carbon lamps and as most of these installations had been arranged for use of 16-candle power lamps these were replaced with 23-watt tungsten lamps to give approximately the same illumination. In rearranging lighting circuits for remodelled cars and installations of new equipment an endeavor has been made to use a lamp of larger candle power with fewer units per car, in order to get the durability of a larger filament. The results of some tests extending over a period of several years after carbon lamps had been replaced with tungsten-filament lamps show a net saving in the cost of energy after the additional cost of tungsten lamps reinstalled had been deducted of 25 cents per 1000 car-miles.

The advantages of the electric heater result from light weight, smaller fire risk, low maintenance, reliability, possibility of accurate regulation, cleanliness and small space required. The operating cost of electric heating is a serious one and this fact has been especially emphasized during the past winter.

#### Thermostatic Control Saves Money

The use of thermostatic control for regulating the electric heaters of cars has produced a large saving. Careful observations taken in actual service have shown that this saving amounts to 30 to 40 per cent of the total power used for heating in some cases. The heat

from the passengers' bodies aids in heating the cars more than is usually supposed. A crowded car is many degrees warmer than an empty one consuming the same current.

During the rush hours cars traveling in one direction are usually crowded while those going in the opposite direction are comparatively empty. These varied conditions can be met successfully only by having an accurate automatic control of the heaters. The heating current load, occurring as it does during the winter months when both the lighting load and the power load are increased considerably, is worth more than its proportion of the total cost of power. The "top of the peak costs most" and any reduction in heating current decreases the peak load.



High-grade maintenance will assure savings expected from new equipment

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# Ventilated Motors During a Strenuous Winter

**Neglected Commutator Covers of Old Motors Gave More Trouble Than Clogged Drain Holes of Ventilated Type—The Latter Motors Can Be Protected by Snow Shields, Better Insulation, Etc.**

*By R. E. Hellmund*

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**T**HE great amount of troubles and breakdowns experienced during the very severe winter season of this year, in connection with car equipments, naturally suggests the following questions with regard to the motors:

1. To what extent is the introduction of the ventilated type of railway motors responsible for breakdowns?

2. What can be done with regard to operation and maintenance to avoid a recurrence of the recent experiences in connection with the motors?

3. Is the ventilated motor a practical proposition and is it destined to survive?

To get an answer to the first of these questions, a number of the writer's associates visited a great many electric railway properties during, or soon after, the severe snow storms of this season and also while the exceptional water conditions existed when large amounts of snow were thawing within a few days. Unfortunately, a good deal of confusion existed in most places, due to the fact that the troubles to be taken

care of were usually far in excess of the shop capacities for handling them. The records, therefore, were not fully kept, and this led often to confusing and contradictory information with regard to the number of failures, their location and their probable cause. Nevertheless, it was possible to reach the following conclusions with a fair degree of certainty:

## **Snow and Water Proved Even Worse for So-Called Closed Motors**

A certain amount of damage is done every year to the motor equipment on account of the dampness within the motor caused by snow and water conditions. These troubles were more numerous than usual during this year's winter season, but, except on a few properties where special conditions prevail, they were hardly more numerous than should be expected if the greater severity and the more continued snow condition are taken into account. Actually the older so-called inclosed motors suffered more than the ventilated motors. This difference, however, can be accounted for by the difference in the age of the motors, and the quantity of the trouble which develops does not seem to be a question of the type.

*(Concluded from page 506)*

Another improvement that is worthy of consideration in these times of earnest effort to effect economies is the use of the heat from the resistors and main motors to help heat the cars. Several schemes for using this waste heat have been developed, but so far, I believe, have never been tried in actual service. On one particular installation of new equipment I recall that the registers were located so as to be available for such use, but an actual trial was never made.

On closed vestibule cars, one-man cars, and centre-entrance cars, the use of some type of trolley catcher or retriever has come to be considered as a necessity. On these cars when the trolley wheel leaves the wire the car must be brought to a stop before the pole can be pulled down and the wheel replaced on the wire. Much of the popularity of these modern cars is no doubt due to the effective service given by trolley retrievers.

## **This Is the Day of Car-Checking Devices**

A large part of the electric car equipment in operation is not of the latest type and does not possess many of the improvements to which I have called attention. The attainment of the highest efficiencies possible with such equipment lies in its correct operation. Electric railway service contains many waste factors. To keep these at a minimum requires constant investigation and checking. Any automatic checking

device intelligently used will pay for itself many times over. The mere installation of coasting recorders or power recording instruments on the cars of a company will not effect economies. They must be properly and intelligently used to insure the desired results.

Neither is it sufficient to instruct the men responsible for the operation of the cars as to how and why economies are produced. An incentive must be offered the men in order to get them to practice and put into effect the knowledge and instruction which is given them. They should be paid something for saving energy and time. Their work should be checked carefully and earnestness shown in preventing waste of power.

A great deal can be accomplished by personal follow-up work. The average motormen are bound to appreciate this man-to-man policy and, aside from the saving in time, power and wear of equipment parts, it will make thinking men of them. They will thus become better and more efficient in other ways.

There are many pieces of equipment on our modern cars, other than those specifically mentioned, that are being continually improved and their use is producing savings in labor, time and maintenance costs. Such are sanders, fenders, wheel guards, buzzers and other signals, headlights, signal-lights and markers, anti-climbers, storage-batteries, fuses, trolley parts, fare boxes and registers. It will be unnecessary to indicate here how these contribute to the desired end, but they should be kept in mind in any study of the subject of economy.

This fact seems at first somewhat surprising, but it is easily explained. Much of the damage in both ventilated and non-ventilated motors was caused by faulty conditions of the motor covers and drain holes. This was especially the case in parts of the country where severe snow and water conditions are not usually experienced. Thus, it was found that on certain northern railway systems, where the operators are accustomed to taking care of severe snow and water conditions, very little trouble was experienced, although an appreciable amount was reported from some systems farther south.

#### **Melted Snow Refrozen and Drain Holes Clogged with Snow**

Much of the snow which caused damage to the motors entered through the top commutator opening on account of missing or badly fitting commutator covers. On some properties the motors are purposely operated without commutator covers during the summer season in order to keep the motor temperature low, and these covers were not replaced at the beginning of the winter season, as would have been advisable. In other cases commutator covers were not properly tightened and were therefore lost during the summer. In still other cases the commutator covers had been adjusted, for convenience, so that they could be easily removed, and this caused bad fits and large spaces between the motor and the cover for snow to enter. It was observed that with such conditions snow was pushed into the motors in very large quantities when the cars bucked snow banks.

A good deal of trouble also was caused by snow blowing in through the top openings during a storm. In such cases, if the motors have been operated and are fairly warm and the car then stands still a considerable length of time, either while the service is intentionally suspended during the night or because the car is stalled in a snowdrift, it is especially bad to have the snow drift into the motor at the top. Such snow will naturally settle partly on top of the commutator and armature and partly on the brush holders. In the beginning these parts are warm and partly melt the snow. Later these parts cool off and get below the freezing point, so that the partly-melted snow refreezes into a solid mass of ice. It is easy to imagine the result when an attempt is subsequently made to start the motors. In quite a number of cases the brush holders were frozen stiff, making it impossible for the carbons to move up or down, while, at the same time, irregularities caused by ice on the commutator make such a movement very desirable. Whenever a motor starts at all under this condition, flashing and burnouts follow.

Another cause for many failures was found in the faulty conditions of the drain holes at the bottom of the motor. In many cases carelessness in oiling without gaging and consequent flooding of the bearings had caused the collection of oil inside of the motor near the drain holes, and this oil, with the dirt which collected in it, had blocked up the drain holes. In other cases it was found that the drain holes had been purposely blocked up to prevent water from entering the motor. In still other cases the drain holes were frozen shut either because the motors ran very cool or they became frozen while the car was standing still, and the motors were allowed to operate before the ice was removed from the drain holes. In all such cases the water from the melting snow or otherwise collected

was retained long enough in the motor to soak the lower field coils thoroughly and cause them to break down.

Another fact which was brought out by the investigations is that motors on low-floor cars give more trouble than other motors, on account of the small clearance of these motors above the track. This is especially true where severe water conditions prevail. It is to be expected, also, because it is evident that water collects on the track in a good many cases high enough to enter a motor with 2-in. to 3-in. clearance but not high enough to enter motors with a considerably larger clearance.

A study of the failures caused during the snow and water periods showed that a good many of them occurred in definite weak points in the motor and that these weaknesses were caused by a great many circumstances, such as defective workmanship brought about by the difficulty of securing skilled labor, severe overloads which had caused roasting some time in the past, etc. These weaknesses would have resulted in breakdowns at some time or other even without special conditions, but the severe snow and water conditions simply served to hasten the breakdown. This in itself would not be very serious if it had not been for the fact that all such breakdowns occurred at a time when the shops were already overtaxed.

#### **Ventilated Motor Lighter, So Absorbs Less Heat**

In this connection it is worth while to discuss one point in which the ventilated type of motors is liable to give slightly more trouble than the non-ventilated motor unless the motor is properly applied. Ventilating motors have for a given continuous rating considerably less weight than non-ventilated motors. Under ordinary operating conditions this is of little consequence, but under emergency conditions such as obtain while cars are bucking snowdrifts, pulling disabled cars home, etc., the ventilated motor, if applied to the limit of its continuous rating under normal operating conditions, is more liable to roast out than the old non-ventilated motors. The extra weight of the latter and the larger masses can temporarily absorb during heavy overloads of short duration a certain amount of heat and thereby prevent overheating. This has always been realized by the designing engineers, but the strong tendency of the last years towards reduction in weight has led to a number of rather close applications of the ventilated motors. In such cases the severe service conditions of the past season have roasted out a number of motors, causing poor insulation conditions. Snow and water which get inside of the motor in such cases constitute then only a contributory cause for trouble, in so far as they hasten the failure of roasted parts.

A number of failures of ventilated motors have also resulted from the opposite extreme of practice, namely, where cars have been over-motored. Particularly during the early days of the ventilated motors, a number of installations were made where ventilated motors of the same weight and size were applied in places where inclosed motors were previously used. This plan results in exceedingly cool running motors, but with not sufficient heat to dry out and evaporate whatever dampness gets into the ventilated motors, although the inclosed motors previously used were always warm enough properly to take care of this dampness. In such



cases there have been a few more breakdowns with the ventilated motors than with the old inclosed motors.

It is evident from these facts that the great amount of trouble experienced this winter can hardly be blamed on the ventilated motors but is principally due to the more severe weather conditions, insufficient maintenance, rather close and too liberal applications, or the like. It is logical, therefore, to consider ways and means for remedying the real causes of the trouble; especially so in view of the fact that the expenses and losses caused this winter to many properties, both in the form of shop labor and lost revenues, exceed the \$100,000 mark in many cases. This fact clearly indicates the wisdom of expending some money during the summer and fall seasons to prevent a recurrence of the recent winter troubles.

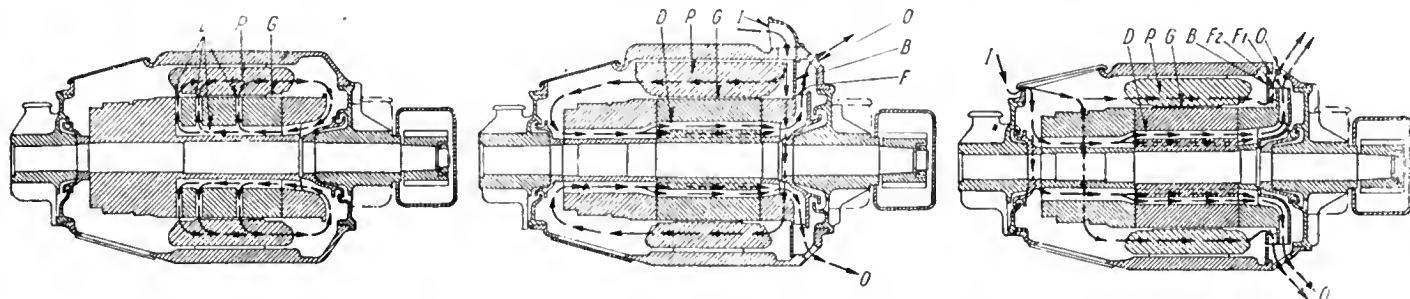
#### Care of Commutator Covers and Drain Holes Is Essential

It is at once evident, from what has been said, that steps should be taken properly to maintain all motor covers, especially to replace all missing commutator top covers and properly tighten them if necessary, by

are closed also so tightly that no water can enter the motor. In such cases care should be taken to open the drain holes at regular intervals in order to drain whatever water may have collected in the motor before it does much damage. Only under this condition is it at all advisable to resort to the closing of drain holes.

Where the drain holes are not closed and the motor passes through pools, water will enter the motor casing and may cause some damage, but usually much less than that caused by water retained within the motor indefinitely. If drain holes show a tendency to freeze closed during exceptionally cold weather, they should be cleared of ice as often as practicable. This can easily be done in a few minutes by the pit man pushing a hot steel rod into the holes from the pit.

The proper procedure with regard to the ventilating openings of the ventilated type of motors has to be governed to a large extent by local conditions, and no general rule can be formulated. Our investigations have shown that if a small amount of snow gets into a ventilated motor through the opening, it does not cause any harm if the drain holes are properly maintained and if the motors run fairly warm. To know



THREE TYPES OF MOTOR VENTILATION—FIG. 1—INCLOSED RADIAL-DUCT TYPE MOTOR; FIG. 2—SERIES VENTILATED FAN-TYPE MOTOR; FIG. 3—PARALLEL-VENTILATED FAN-TYPE MOTOR

While Fig. 3 shows the air intake on top, most recent motors of this type have them lower down, the advisability of which has been borne out by the experience of the last few months

applying felt linings before the winter season begins. Especially in interurban service, perfectly fitting covers are of great importance during snow storms. Furthermore, the drain holes of the motors should be kept open in all motors all the time. It is true enough that once in a while closed drain holes may keep water out of a motor and prevent a breakdown when the car runs through a deep pool of water over a considerable distance. Much more frequently, however, closed drain holes will hold water, which cannot be entirely prevented from entering the motor and remaining long enough around the bottom field coil to soak it completely and cause its certain breakdown. Even in an entirely inclosed motor there are always air openings to let water-saturated air enter the motor at times. If this air subsequently cools off while the car is standing idle during the night, for instance, the cooling air will deposit dampness either in the form of condensed water or, when it is very cold, in the form of frost on the motor parts. If such water, after running toward the bottom of the motor, is allowed to drain out promptly but little harm will be caused, but if it is kept within the motor it usually will cause damage. For this reason drain holes kept open all the time by proper inspection and maintenance are usually less of an evil than blocked drain holes. If, in case of flood conditions, it seems desirable temporarily to block the drain holes, great care should be taken that all other motor openings

whether such conditions are fulfilled it is advisable for properties operating ventilating motors to take sufficient temperature readings under actual operating conditions to determine how the motors are loaded. If it is found that the motors run relatively cool, that is, if they have a temperature rise of not more than 40 to 50 deg. C. over the surrounding air under the most severe service conditions, it may be advisable to replace the ventilating covers partly or entirely by closed covers during the winter season; it may also be advisable, for similar reasons, to cover up some or all of the air outlet openings. But if the motors while fully ventilated run hotter than the temperature mentioned, it may be dangerous to reduce the amount of ventilation, and if from the experience of the past season an improvement is desirable besides that which can be accomplished by proper maintenance of covers and drain holes, other steps may be necessary.

#### Snow Shield Protection Possible for Ventilating Motors

In certain localities the use of shields in front of the motors, preventing large quantities of snow getting near the motor, has given very satisfactory results. Such shields should preferably be of substantial steel construction, since canvas covers which have been tried can hardly be maintained in proper condition more than a few days. In fact, it would seem advisable to pro-



vide, wherever possible, shields so substantial that they can serve at the same time as snowplows and so set that they will keep the snow level lower than the bottom of the motor and the gear cases. This would have the additional advantage of eliminating troubles caused when the motors and gear cases ride on the snow. In a great many localities, especially inside of towns, such a condition is not unusual in winter. The result is that considerable snow, mixed with sand and dirt, is scraped into the motors. Furthermore, gear cases have been worn through so that sand and snow have got into the gears. It is estimated that the damage thus done this winter to the gears and gear cases amounts to many thousands of dollars.

### Fill Up the Cracks in the Insulation

While the previous suggestions for keeping snow and water out of the motors will undoubtedly give better results, some dampness will frequently get into the motors in spite of all possible precautions, as already explained in connection with condensation. This dampness will cause breakdowns wherever the insulation is not in perfect condition. It is, therefore, most desirable to keep up the quality of the insulation.

The best and cheapest way in which this can be accomplished with motors which have been in service is by the dipping and baking processes, applied to the armatures and field coils. Any insulation now known will when heated and cooled continuously and when subjected to the unavoidable vibrations of railway service develop certain cracks and small openings. This is particularly the case in motors which have been subjected to severe overloads and which have been roasted because of them. After the insulation has thus developed cracks, it is only a question of time when dampness entering such cracks will cause insulation breakdowns, and the only means for preventing such failure consists in the refilling of these cracks with insulating material before it is too late. This can be very easily accomplished if the armature and field coils are properly dried in a simple baking oven and dipped while hot in Sterling varnish or some equivalent insulating material, then dried in the oven. The varnish will fill up all little crevices and cracks, and, if the process is repeated from time to time, it will prolong the life of the insulation considerably. It is believed that the expense for the equipment and work necessary for this process could have been saved ten times over during the last season on a great many properties.

### The Ventilated Motor Is Best but Requires Good Maintenance

Our third question as to whether the ventilated type of motor is destined to survive can now easily be answered with an emphatic "Yes." The evidence so far collected, under actual operating conditions, shows that if properly applied and handled, the ventilated motor will give no more trouble than an inclosed motor. This also follows from the following simple consideration.

It may be true that snow and dampness, at times, get into a ventilated motor in larger quantities than into a non-ventilated motor with well maintained covers. On the other hand, it must also be remembered that the constant air stream going through a ventilated motor will dry out damp insulation rather quickly, while even

a small amount of dampness getting into the insulation of an inclosed motor will not dry out for considerable time. Since it takes some time for dampness completely to penetrate insulation, a small amount of dampness present for a long time is liable to do more harm than a larger amount for a shorter time. Even if it should prove necessary on some properties to change the type of covers twice a year and to adopt some improved methods of maintenance, the use of the ventilated motor is justified because the expense incurred is only a small percentage of the economies that can be accomplished with the ventilated motors.

It must be realized in this connection that the use of ventilated motors and attendant changes have reduced the weight of the motors alone on quadruple-equipment city cars between 2000 lb. and 5000 lb., not counting the reduction in the weight of the trucks made possible by the smaller motors. Assuming, therefore, the customary figure of three cents to five cents per pound extra weight in operating expenses, the introduction of the ventilating motor has made possible an annual saving of \$75 to \$300 per car. This being the case, it is good economy to spend a small percentage of this money in extra maintenance which may possibly be required with ventilated motors. The argument often advanced that it is impracticable to change covers a couple of times a year or properly maintain insulation must simply be discarded as long as a marked resulting economy with the ventilated motor is possible.

It should further be kept in mind that the ventilated motor is a rather new piece of apparatus and that not only its maintenance can be improved along lines suggested in this article but that it will also be possible to accomplish improvements with regard to its design and to its proper application. Recent experience has shown that such improvements are desirable even if they have to be accomplished by means of a slightly increased first cost of motors.

### Streaking of Railway Motor Brushes

JOHN SWIFT DEAN, of the railway engineering department Westinghouse Electric & Manufacturing Company, has recently investigated the causes of the peculiar streaks or grooves which run along the front and back surfaces of brushes that have been in service for some time. Study of the streaking on a number of samples led to the hypothesis that it was due to particles of sand and dirt working their way down between the carbon and the carbon box. These, by constant vibration, movement of the carbon and the action of gravity, cut small grooves in the sides of the carbon.

This conclusion was confirmed by tests with and without current between brushes and boxes, the following test results being noted: (1) Pronounced streaking of carbon exists. (2) Streaking was produced when electric current was not present. (3) Considerable dust and dirt were in evidence. (4) When dust and dirt chutes were provided no streaking was produced. (5) When the dust and dirt were removed streaking was eliminated. (6) Sand particles were found lodged in groove.

From these results Mr. Dean was convinced that the grooving or streaking of railway motor carbons is due to the abrasive action of the grit, as he had surmised from his preliminary studies.

# The Testing Organization of Electric Railways

**This Analysis Shows How Useful Such a Department Can Be and How Diversified Its Work Becomes in a Large Electric Railway Organization, Affecting All Phases of Construction and Operation**

*By Hartley LeH. Smith*

Chief of Testing Bureau  
Brooklyn Rapid Transit System.

**I**N CONSIDERING the work of a testing department the first question which merits discussion is whether or not such a department is worth while and economical. To justify itself it must result in the more systematic and efficient handling of certain things which are indubitably worth while.

The tendency of the times is to make tests. When it is decided that necessary or desirable tests shall be made with frequency, a testing department is created; until then, such tests as are made are handled by outside laboratories.

Electric railway tests, like all others, may be classified as those which are necessary and those which are desirable. Of necessary tests, practically all electric companies, railway or otherwise, are agreed that watt-hour-meter calibrations shall be so classed. The division line between necessary tests and desirable tests is an extremely elastic one.

If a testing department exists the tests which are considered either necessary or desirable, and, being so considered, are made, depend really very intimately upon the relationship of the testing force to the departmental organization of the corporation. Tests might, for instance, be very closely associated with purchases. Where this was true the testing organization would be intimately connected with the purchasing organization. On the other hand, tests made on materials purchased are much more likely than not to be made on materials bought under technical specifications: *i.e.*, engineering specifications. Such specifications are naturally prepared by the engineering department or departments. Thus a natural link is at once found between the testing organization and the engineering organization.

Modern testing, of course, is an engineering matter. As a matter of fact, it is now fairly established as a branch of engineering. I need only point out that one of the great national engineering societies, the American Society for Testing Materials, is one devoted specifically to testing. So a testing organization is almost sure to be an engineering organization, manned by engineers. In an overwhelming majority of cases the testing organization of any corporation constitutes a part or branch of one or more of the engineering departments of the corporation. It might be thought that if there are more or less separated engineering departments in

a large organization the testing force would in some way be equally associated with or related to them all. Such would, indeed, be the logical arrangement.

Tests may deal with materials or machines. The distinction is quite real. There is, for instance, the American Society for Testing Materials, cited above, but as yet there is no national society concerned particularly with the making of tests on machines, and perhaps there never will be. There are, instead, the codes of several national engineering societies dealing with the methods of making tests on some of the important classes of engineering apparatus. For instance,

there are "the power-test code," adopted by the American Society of Mechanical Engineers, and the "standardization rules" of the American Institute of Electrical Engineers.

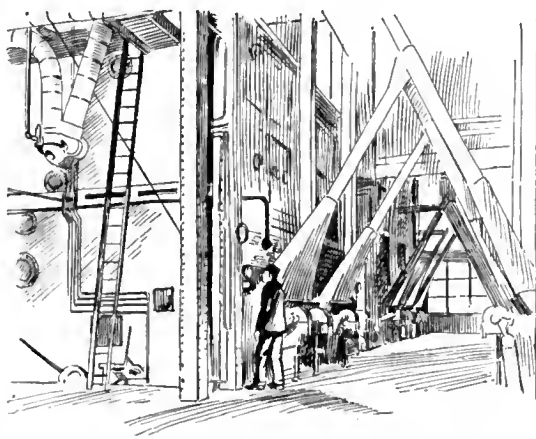
Among other broad divisions into which the work of a testing organization of an electric railway may be classed, so far as new material and apparatus are concerned, these three seem pertinent; first, continuous supplies; second, apparatus installed for extensions and betterments, purchased under guaranteed - performance specifications, and tested for acceptance; third, materials and apparatus on trial.

Of the first class a long list might be written, but some very common illustrations are coal, oil, condenser tubes, boiler tubes, incandescent lamps, trolley-line material, car wheels, axles, bolts, cement, paint, etc. In the second class a partial list including turbines, condensers, boilers, automatic stokers, centrifugal pumps, blowers, static transformers, rotary transformers, circuit breakers, high-tension cables, etc., might do. Of the third class, coals and oils other than those which have been customarily used, all sorts of steam specialties, lightning arresters, rail bonds, and many other things, might be mentioned as illustrative.

## Deterioration Tests Another Function of the Testing Department

Another large field of work for the testing force is in inspecting material and apparatus during manufacture. In some of the most advanced organizations this work receives great prominence. As an important contribution along this line I would cite the paper entitled "Testing Is Not Inspection," by W. A. Aiken, read at the annual meeting of the A. S. T. M. in 1908.

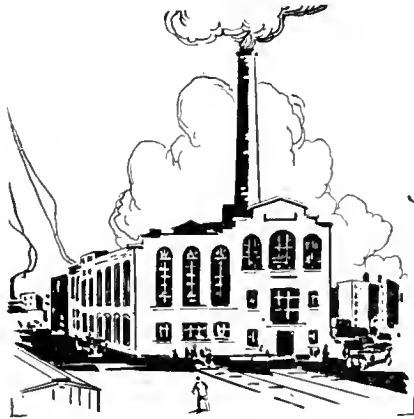
Another class of work for the testing organization is in making tests to detect deterioration of the efficiency



Steam gages need calibration now and then

of apparatus which has seen considerable service. Such tests are of much aid in securing reasonable maintenance of the original efficiency of the apparatus throughout its life. Such tests, for instance, might show that the blade clearance of a turbine has increased and turbine castings become warped, both contributing to higher steam consumption; that pump impellers and casings have suffered erosion, with resulting falling off of efficiency; or that engines have developed valve and piston-ring leakage, clearly evident in indicator cards systematically taken and analyzed.

A still further field for the department is in tests made on apparatus for the detection of developing obso-



From foundation to chimney the testing department can find something to do

lescence. This is intimately related to the evolution of more highly efficient forms of apparatus designed for the same work. As illustration, the ageing of transformer iron may be cited, with its effect on substation efficiency, or as measured by uneconomical iron losses where potential is continuously maintained regardless of load. Still another illustration is in the detection of increasing current transformer errors due to aging of iron, with its effect on watt-hour-meter registration.

#### Tests Related to Improvement of Operating Conditions

Among the lines of work for the testing department which are of importance are those which deal with studies of operating methods. For instance, in power-station work there are tests made for the purpose of revealing those operating methods which will yield high efficiency under fundamentally controlling conditions of operation; that is load factor, extreme range between maximum and minimum loads, etc. Take, for example, the matter of banking boilers. This operation involves losses, but, depending upon the furnace equipment, some boilers will give astonishingly high over-all efficiency when steaming at low rates. These same boilers may show a falling off in efficiency to disappointingly low, but nevertheless legitimate, values in hours of heavy peak loads.

Merging closely with the above are studies which attempt to show the operating conditions and methods which will bring about the ultimate desideratum of power-plant economy; that is, such operation as will cause the summation of the fixed capital charges and the operating charges to be a minimum.

For instance, it does not at all follow that a turbine should be operated at its most economical water rate. Important papers on power-plant operation, based upon

a realization of all these general principles, have been read before some of the national engineering societies, and certainly in the future this subject will receive a great deal more detailed attention than formerly.

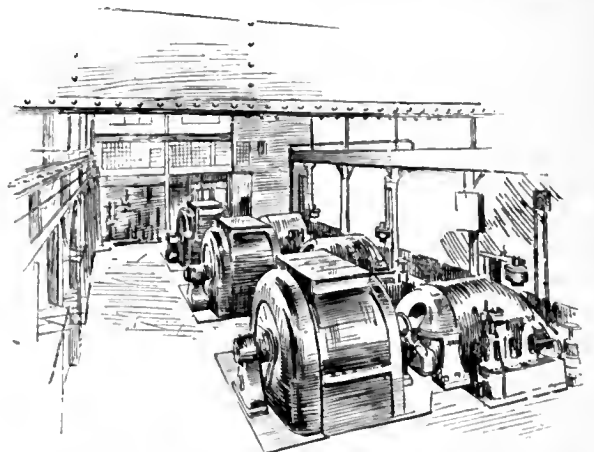
Another set of general tests includes those designed to give clear-cut information as to the methods of operation and maintenance which will favorably affect the heat balance of the station as a whole. For instance, there is the important problem of exhaust steam from auxiliaries; that is, as to the excess or deficiency of it, and the action taken regarding such excess or deficiency. In many stations to-day provision has been made for the connection of the auxiliary piping system, not only to the feed-water heaters but also to the low stages of one or more turbines, thus allowing considerable practical control of the heat balance.

Certain variations in operating procedure are dictated by seasonal variations throughout the year. Two sources of heat supply (when the heat balance is rigorously considered) fluctuate very greatly with respect to entrance temperature throughout the year, namely, the feed water as taken from the city mains, or other outside source, and the intake circulating water. The feed water, in so far as it comes from an outside source, is able to absorb a far greater quantity of exhaust steam in the winter than in the summer; and similarly the seasonal variation in intake circulating water is so great as to make large changes in the quantity of circulating water which are most economical in winter, on the one hand, and in summer on the other.

#### Routine Testing of Water and Other Power Plant Elements

Apart from tests and studies which have classifications such as outlined above, there are in the modern power station certain tests which do, or should, constitute essential parts of daily operating routine.

Foremost among these are tests which deal with water treatment. Where turbines are used, it is only under rather extreme circumstances that surface condensers are not used. The only justification for surface con-



Here is a fertile field for the testing engineer

densers is the use of the condensate as feed water. Where feed water has to be purchased from a municipality, the potential saving in the use of the condensate from surface condensers becomes enormous; so large that to forego it is prohibitive.

The use of condensate from surface condensers, however, involves many a problem. Except where the power station is so fortunately situated as to have unusually

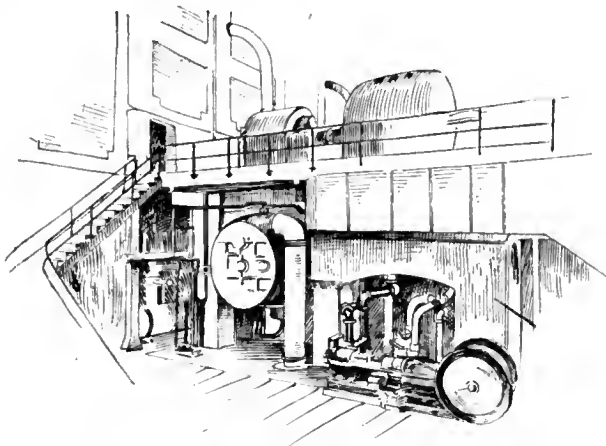
good condenser circulating water, I do not think it is possible to continue long the use of water from the hot wells of the condensers as feed water unless such use of it is controlled throughout by daily laboratory tests. Condenser tubes will develop leaks, and, as such leaks are the result of attack of the circulating water on the tubes, water so leaking becomes a contaminating influence in the feed water, and will cause trouble if not controlled.

#### Tests for Impurities in Condensate and of Conditions in Condenser

The sort of tests which in the aggregate constitute a system of adequate control is an extensive subject in itself. Certain fundamentals, however, can here be set down. When the tube leakage in any one condenser has become too great the entire hot-well water from that condenser must be thrown away until such time as the condenser can be shut down and repairs made. While it continues in operation with its water so contaminated by condenser-tube leakage as to prohibit its use as feed water an equivalent feed-water supply must be obtained from the alternative source, in general from a municipality, at a rather high cost per cubic foot.

The water from the mains of a municipality seldom constitutes an ideal boiler feed water; in other words, it compares unfavorably with the hot-well water from a condenser in which the leakage is slight, or even negligible. Therefore, it becomes a problem of correctly establishing the standard of allowable leakage through the condenser tubes into the hot well, after which the hot-well water will be temporarily thrown away.

Next in the order of these problems is that of scale prevention. The hot-well water will normally come to the feed-water heaters with certain amounts of condenser leakage water in it, as outlined above, and will consequently, in practically every case, be a scale-forming water. So also, in general, will be the water taken from the municipal mains or other outside source.



Tests of condensate are essential to safe operation

Prevention of objectionable scale is a necessity, and laboratory tests of some sort are essential to control the water treatment, whatever the treatment may be. After the water has been treated with reasonable satisfaction in this respect, it may, as a result, be of such nature as to induce priming. Hence, water tests for the specific purpose of avoiding priming difficulties become quite as essential as those which deal with the scale-prevention treatment.

Among the tests which are practically essential parts of daily operating routine are those connected with the maintenance work involved in maintaining first-class vacuum on large turbines. The last quarter-inch of vacuum obtainable in turbine practice is of the most urgent importance. The items which should have daily watching and control by tests are the adequacy of flow of circulating water, the air leakage, and the efficiency of air removal.

The adequacy of flow of circulating water is affected by the obstructing material which may have accumulated in the water boxes because it was not entirely caught at the intake screen. Daily tests should therefore be



Where there is enough work for him an expert chemist should be a part of the testing organization

made to determine the temperature rise of the circulating water, which data in connection with simultaneous turbo-generator load data suffice for calculating closely enough for the purpose the quantity of water circulating. This will be found to undergo quite marked reduction between intervals of water-box cleaning or condenser-tube scraping. A fixed schedule for such work is not satisfactory because obstruction due to accumulating trash is itself irregular, due very largely to the effect of weather conditions on the source of condensing-water supply, usually a river.

The air leakage into a condenser due to obscure causes is variable, and quantitative measurements are an aid in the general work of vacuum maintenance. Some years ago, in large power stations, the practice of using the following simple device became rather general. It embodies the principle of a gas holder or tank. The air, leaking into a condenser and withdrawn by a reciprocating dry-vacuum pump, is discharged into the device, causing its movable element to rise as the air accumulates in it above a water surface. The time of rise is measured with a stop-watch, and the quantity of air is calculated in cubic feet per minute, or other convenient unit. The power stations which have adopted this practice look upon it as well-nigh revolutionizing the problem of insuring that their condensers are free from objectionable air leakage. Such a device can be used immediately to render large air leakage evident.

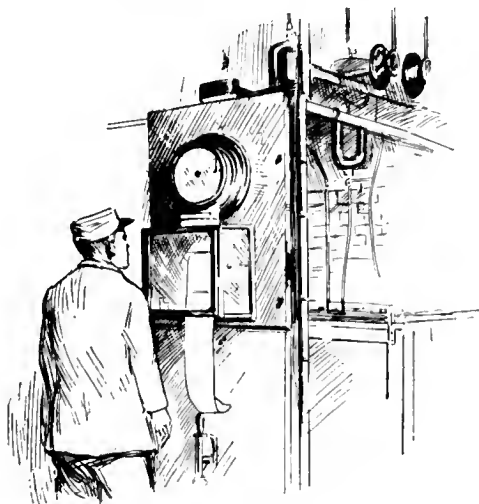
There is, however, another aspect which perhaps has not had quite such general recognition, namely, the effectiveness or efficiency of air removal. All of the air which leaks into any condenser is removed by the air pump, otherwise there would be an accumulation of air in the condenser, and the unit would soon go to high pressure. To show what is involved in effective air removal it is only necessary to name the means used to measure it. To this end the valve in the air suction line between the air pump and the condenser is closed, and a reading is taken of the vacuum which



the pump is able to "pull down" against the closed valve. If the pump is in proper operating condition it will naturally "pull down" a very high vacuum. Often enough, however, it will do nothing of the sort, and maintenance or repair work is accordingly at once indicated as urgently necessary on the pump parts themselves.

### Some Factors in Maintaining High Vacuum

Some very interesting relationships exist, indeed, between the effectiveness of air removal, the quantity of air leaking into a condenser (and hence removed actually by the pump), the vacuum accordingly maintained in the condenser, and the type of air pump. There are on the market several kinds of air pumps embodying the ejector principle, and so constituting a radical departure from the old-line reciprocating pumps. Among these types great differences exist, as can be seen from curves plotted to show the vacuum possible to maintain in a condenser under given conditions of turbine



Graphic meters are of great help in testing

load, circulating-water temperature and quantity of flow, in terms of the quantity of air leaking, and accordingly removed by the pumps.

Most reciprocating pump equipments in actual service are really of greater capacity than is ordinarily recognized. When such pumps are so maintained as to give effective air removal they will take out of a condenser the quantity of air leaking into it with such relative ease as to make the extent of air leakage of rather secondary importance. That is to say, if a reciprocating air pump is kept in fine mechanical condition one need not worry greatly over the quantity of air getting into the condenser.

With certain ejector pumps, however, the operating characteristics seem quite different. The vacuum which can be maintained in the condenser itself is not only a definite but one might say that it is a considerable function of the quantity of air leaking into a condenser. In such cases great care needs to be taken to keep the condenser air leakage down to a low minimum if the pump has small capacity. If it has large air-removing capacity it is apt to make considerable power demand.

Attention may also properly be called to the fact that it is with just this sort of equipment that no effective device has as yet been developed which will permit of measurement of the air leakage in absolute terms. This,

however, is not such a great disadvantage as might be supposed, because it is still possible to judge the condition of such an ejector pump by measuring its vacuum-pulling ability against a closed suction valve, and immediately afterward the vacuum which it can maintain when actually removing air from the condenser.

The rather steep line, previously referred to, connecting its vacuum-pulling ability with the quantity of air removed, suffices to determine whether the air leakage into the condenser is moderate or whether it is large, and thus needs work to bring it down again to moderate values.

### Tests of Boiler Operation

An extremely simple matter which can be controlled by daily testing and which relates to one of the most fundamental and by no means negligible sources of loss of power station efficiency is the determination of the combustible matter in the ashes. Undoubtedly many power stations are following this matter up, as the relationships between true ash in the coal, combustible in the ashes as dumped, and resulting loss of potential heat are well understood.

Of great importance, also, although not so obviously connected with testing, is insuring the cleanliness of the heat-absorbing surfaces across which the gases from the furnace flow and through which the heat is transmitted to the boiler water. As, however, the fluctuations in gas temperatures leaving the boiler are given more attention than formerly, and very frequently are recorded automatically, it generally follows that a testing force becomes considerably involved in such studies.

In this connection it certainly would not do to omit some mention of the determination of the composition of flue gases. A few years ago the writing of papers on this subject amounted to nothing less than an epidemic. If we could gather statistics showing what young men in testing work in power stations really are doing probably the time spent analyzing flue gas or adjusting apparatus which itself automatically analyzes flue gas would appear high up on the list.

### Calibration of the Watt-Hour Meter May Produce Large Cash Savings

Turning attention to the tests which may really be called essential for power station operation, we are confronted first by watt-hour-meter calibrations as mentioned earlier. In many cases, increasing in number, the corporations owning power stations are dependent for their fundamental income upon the accuracy of watt-hour-meter registration. In most electric railway power stations watt-hour-meter registration accuracy still affects only the accuracy of certain statistics, such as the economy figures of the power station itself, the energy consumption of the rolling-stock per ton-mile, figured from the power station switchboard, etc. But more and more every year the registration of watt-hour meters measuring energy supply for railway use is intimately related to cash payments, as the generating end bills the railway for energy as if it were a separate organization.

Probably accuracy of registration of railway watt-hour meters in service averages lower than in lighting or industrial power service because of the more vio-



lently swinging character of railway loads. Large railway power systems naturally suffer less from this handicap than small ones, but large systems are in general worked with substations, and the substation load is usually marked by severe fluctuation. Naturally this is true in a special degree where subway or elevated train loads are carried. The testing force of a railway power company therefore finds itself concerned with the problem of overcoming the handicap and attaining high accuracy in watt-hour-meter calibration. Quite special instrumental means and methods have accordingly resulted.

### Insuring Accuracy of Switchboard Instrument Measurements

In a more general way the electric plant tests, which may be considered in the strictly necessary class in that they are either taken care of by an organized testing force or at less frequent intervals through the agency of outside testing organizations or departments of manufacturing companies, are those dealing with calibration and repairs of the switchboard indicating instruments. Where there is an organized testing force this work on a large system is apt to keep several men fairly busy. The work requires considerable skill if it is to be done efficiently, that is, at lower cost than that involved in having it done by the repair departments of the manufacturing companies.

The requisite skill of the men varies naturally with the type of instrumental equipment, some makers using much more delicate construction than do others. As a general proposition, however, on systems of ordinarily large size really high maintenance standards can be obtained far more cheaply if the instrumental repair work is done by a testing force. Such repair work is so closely connected with calibration, that is, work in which errors are detected and corrected without the necessity of repairing broken parts or replacing them with new parts, that the two kinds of work are generally done by the same men. The instruments requiring this sort of attention on an a.c.-d.c. system include ammeters, voltmeters, static voltmeters, synchroscopes, frequency meters, indicating wattmeters, etc.

### Calibration of Ammeter and Other Shunts

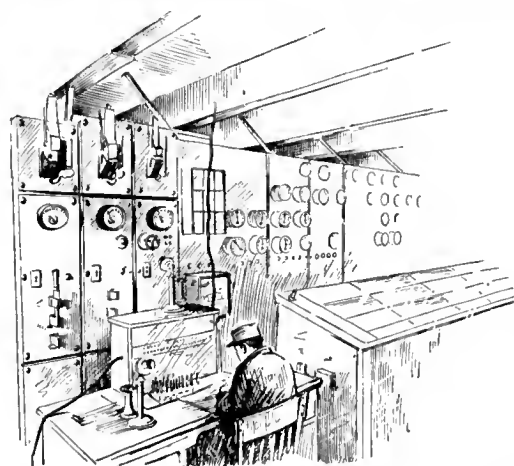
An organized testing force is apt to find itself pretty intimately concerned with the measurement of the ohmic resistance of meter shunts. Such shunts are subject to incidental deterioration. Now and again such a shunt will be overloaded and the avoidance of such overloading may temporarily be impossible. It may as a result suffer change in resistance.

More serious than this, however, because more likely to occur, is possible change in resistance due to handling during installation. Ammeters working on shunts are, of course, in reality milli-voltmeters, and the nominal potential for full scale deflection is generally on record expressed in terms of millivolts. Ammeter calibration itself therefore resolves into nothing more than the calibration of so many millivoltmeters. It is idle, however, to work upon this basis unless it is really known that the shunt resistances either actually have their nominal values or some other values which may be looked upon as substantially fixed for reasonable intervals.

I am speaking, of course, of those systems where effort is made to attain thorough-going accuracy founded upon a substantial basis. In this connection, however, it is worth while to point to the increasing use of the mercury type of watt-hour meters. If charges between one electric company and another or an electric power company and a railway company are to be based upon mercury-type watt-hour meters the resistances of the shunts ought to be measured *in situ*. This measurement of the resistances of shunts after installation is somewhat difficult and complicated. In large stations or substations it is a matter needing not only proper instrumental testing equipment but considerable skill.

### There Is Work on Gages to Be Done Also

Turning to the steam plant, and considering tests which may be called necessary, the pressure gages naturally come in first for attention. There are indeed other ways for a manager to be assured that steam pressures are really what the station log indicates than



The heart of the power plant—the accuracy of every meter must be checked carefully

to have a testing force to calibrate steam gages. But it is true that in a large station where there are many gages the average of accuracy is apt to be low unless an organized testing force is looking after them.

If such gage testing is done it is naturally done all along the line—water gages, air pressure and draft gages, vacuum gages, etc. In a large station with considerable instrumental equipment, maintenance and calibration of such instruments have just about the same status as in the case of electrical instruments. That is, to a considerable extent repairs are made by the testing force, and the general maintenance of instrumental accuracy where repairs are not necessary provide a considerable amount of work. To specify definite instruments may seem to be criticising certain of them, but broad experience will not lead to such a deduction. If there is a plentiful supply of steam-flow meters, recording pressure gages and thermometers, not to speak of CO<sub>2</sub> recorders, there is apt to be plenty of work.

### Adjustment of Relays Naturally Falls to the Testing Department

A somewhat different viewpoint in considering the testing department from any of the above may be had by considering certain apparatus, and the adjustments and tests made upon it relating to automatic handling

of emergency conditions. Going back to the electric plant, an extremely important case in point is that of relays operating oil switches of the high-tension system. The practice of different operating companies seems to vary very widely with respect to the underlying ideas upon which relay adjustments are made, and there is also much variation in the plans used to insure reliable operation. Companies differ also in the extent to which they have pushed experimental investigations along this line.

Where there is a testing force it naturally handles the matter of relay adjustments. The ease, accuracy, and reliability of such work have been increased in recent years by the development of a device which uses the cyclic variation of current of an alternating system as the quantity against which the operation of relays is checked, rather than against time measurements with a stop-watch. In using this plan it is only necessary to see that the frequency of the system at the time of making adjustments is substantially normal.

Adjustment of relays with a stop-watch is unsatisfactory because the only truly significant thing about relay action is how it acts when the actuating current is large. When it is large the relay action is quick and the time interval so short as to render stop-watch measurements unreliable. With a cycle counter accurate measurements of very quick relay action are at once attainable. Hence it becomes possible to adopt adjustment schemes which not only make provision on paper for properly selective action between relays on different

parts of the power transmission circuits but which actually allow of the attainment of such selective action.

In practically all inverse-time relays in actual use at the present day, excluding only certain very old types, the relations between time and current are very definite: These characteristics are more flexible than are sometimes supposed. A well-designed system for the several relays at different parts of the power transmission circuits will show provision for selective action based upon a given margin of relay reliability at any currents within the limits of possible action. It will also include in its provisions the time required for the successive operation of oil switches as distinguished from relay operation. All this can be shown in a group of curves.

The testing force making relay adjustments will work with these curves so that, although the testing loads during successive calibrations may not for one reason or another always be identical, the adjustments given the relays will be such as will make them operate in a definitely known manner. The need for, and the great operating benefit derived from, accurately working selective relays on a complicated system is such that a testing force engaged in the work of adjustment is used also to keep track of the maintenance of adjustment in a systematic and routine manner.

To take an illustration from the field of matters more

or less akin to the above discussions of electrical maintenance, let us consider the subject of safety valves. Safety valves, whatever else they are, are mechanisms of sufficiently complicated principles of design to give them in certain service characteristics not widely appreciated. Ordinarily one thinks of "popping pressure" and "blow-down" as about the whole safety-valve story, but a testing force can sometimes reveal unexpected limitations of types a bit antiquated, indicating the desirability of modernization.

### The Organization of the Testing Department

With respect to organization of the testing force, its three divisions are manifested at once. Incidentally they follow rather inevitably the broad division lines which appear in the field of engineering education in so far as that field has direct relations to power plant service.

The young men engaged in testing work are, generally speaking, graduates of engineering schools. Probably no such testing force is, however, exclusively composed of such men. The schools turn out among others graduates in electrical engineering, in mechanical engineering and chemistry or chemical engineering. The testing work of such power plants naturally falls into these three classes. There is no small amount of interchangeability between the electrical and mechanical engineering graduates, since all electrical engineering courses teach much concerning mechanical engineering



Here is the watt-hour meter. If its readings are inaccurate great loss of money may result

and mechanical engineers are taught a whole lot about electrical engineering. This interchangeability is such as to be able to bear considerable strain in actual service. Exigencies of organization building and the natural capabilities and adaptabilities of individual men, which after all always override any rigid educational demarcation lines, bring about now and then applications of this sort of strain. The writer once had simultaneously, for instance, an electrical engineering graduate in charge of steam testing and a mechanical engineering graduate in charge of electrical testing.

In the line of chemistry interchangeability hardly works. Electrical and mechanical engineers are taught chemistry but they are not chemists. In the testing work of a small or moderate size electric power plant a man not a specifically graduated chemist often does sufficiently well, but in the more highly specialized work of really large plants no great success could be expected. Much of the testing work of a mechanical nature around an electric power plant is fairly simple, but some is not. Where any approach to general quantitative analytical work is made a real chemist is required.

The writer ventures to predict that in the not distant future another branch of the engineering educational field will be tapped in manning the testing force of large electric railways, that of metallurgical engineering. The extension of the metallurgy of steels in re-

# Labor-Saving Methods in the Way Department

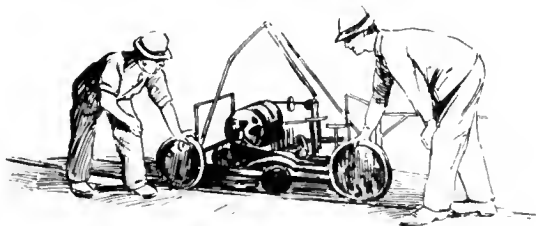
**The Author Analyzes the Possibility of Utilizing Effectively the Many Machines and Tools Which Are Now Available for Performing the Operations Involved in the Up-Keep of Track Work**

*By Roy C. Cram*

Assistant Engineer Department of Way and Structure  
Brooklyn Rapid Transit System.

THE labor conditions created by the entry of the United States into the war have had a strong influence in directing attention of way departments to the possibilities for saving labor through the extended use of machinery. The use of machinery, up to a comparatively short time ago, was gradually increasing, but there was still a tendency to hold back expenditures for equipment. This was largely due to the fear that too much money might be tied up in equipment, a great deal of which is limited in scope and liable to be idle for long periods, especially in the winter season.

During the past two years, however, it has become evident that the main opportunity to overcome labor handicaps lay in the direction of labor-saving devices, and such machinery and tools now form a part of the way department equipment to an extent which would have excited wonder a few years ago. The way department yards have taken on an aspect resembling contractors' yards, and the general result has been that a much more businesslike procedure



Each class of rail grinder has its place

has taken its proper place in the scheme of things.

If there are any doubts as to the advisability of using labor-saving machinery to the fullest possible extent they should be dispelled by the results obtained from their use by the way department in track work in Elmira, N. Y., last summer, as described by F. H. Hill in the JOURNAL for June 30, 1917. Furthermore, John A. Beeler in his recent report on the Boston Elevated Railway, in commenting on the way department meth-

ods, says: "The methods employed are to be commended. Labor-saving devices have been introduced extensively and the amount of hand work has been reduced wherever possible. This has undoubtedly aided in keeping down maintenance costs. The use of such devices should be extended wherever possible, especially in view of the present shortage of labor."

With the advent of machinery, it has been necessary also to increase the supervision to some extent, because much of it requires a reasonable amount of attention and care if it is to be kept in a condition to give the best service, both in its application to the work and its performance as machinery.

## General Tendency in Adoption of Equipment

The general trend of the interest in special tools and equipment has been toward the adoption of improved forms of work cars, such as crane cars and automatic dump cars; the increased use of the power shovel both for grading and for loading cars; the rapid adoption of pneumatic or electric tie-tamping tools; the broadened scope of the electric arc welders; the increased use of power drills in regular maintenance as well as construction work, and the general rearrangement of storage yards, including the installation of various forms of labor saving devices therein.

## Arc Welders Assume Importance in Effecting Economies

It is somewhat difficult to indicate just where the greatest savings have been effected or to indicate any particular tool or device which has been so signally successful as to excite exceptional comment. Yet there can be but little doubt that the use of the several forms of arc welders now available has contributed a very large share in effecting many economies in men and materials. These devices had their origin in the use of the acetylene flame as first presented to the industry under the name of the "autogenous welding process." Since it involved the use of rather expensive gases, and its range of use was somewhat limited, the process soon gave way to the arc welder, using the very convenient

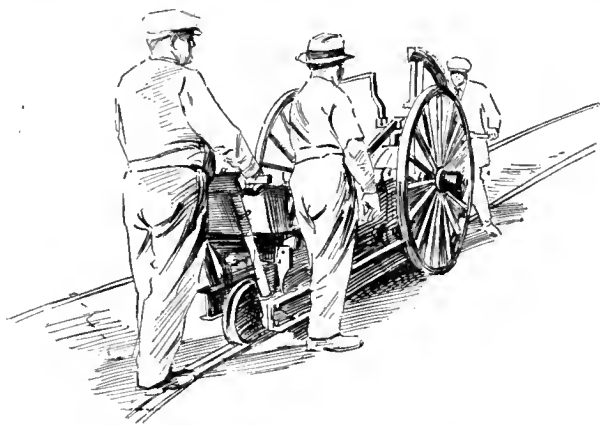
(Concluded from page 516)

cent years, for example, has been very rapid. Likewise, special steels have been developed for special uses and complicated heat treatment is given to such steels during their manufacture and afterward. There is a growing recognition of the value of inspection during purchase of large orders, and a general extension of research in industry. The rapidly extending use of metallography in such work will demand the service of young graduates of the metallurgical schools.

It would also seem possible that the testing work of electric railways will find place for another branch of engineering, if such it may be really called, efficiency engineering. Of course all engineers think of themselves, let us hope rightfully, as in some degree efficiency engineers. Further, it is only too well known that many rather ill-advised activities of so-called efficiency engineers have been such as not to commend themselves to the practical minds of many very capable executives—and electric railway executives on the whole are mighty practical. Still there does seem hope that the wisest among efficiency engineers will overcome the fairly justified prejudice with which a good many of the cult are now viewed, and we may find some young representatives of the class substantially established among the others in the prominent testing organizations in the electric railway field.

power from the overhead wire, until to-day there is no road of any size which is without some form of arc welding apparatus. With the use of the arc welder came a rapid development in the use in connection with the application of a simplified form of electrically-welded rail joint.

The early type of arc welder consisted of an arrangement of grid resistances which was effective but costly if the exorbitant use of power due to resistance losses



The rail grinder should be used for new rail and incipient corrugation

was seriously considered. This has led to the development of dynamotor or motor-generator apparatus which has a greater range of use and is also highly efficient electrically, due principally to the absence of energy consuming resistance. With it all forms of joint welding, metallic electro welding, carbon arc metal cutting and electric bond welding may be done, using only 10 per cent of the current required by resistor types of apparatus.

It has been found that with the arc welder the repair of defective rail joints can be done more quickly, with little or no disturbance to traffic and for about 10 per cent of the cost as compared with the method of cutting out the defective joint, installing an insert with two joints, with the incidental destruction and restoration of pavement and bonding.

#### Grinding Equipment a Necessity Even on New Rail

In connection with arc welders it is to be noted that their effective use, in track work at least, is limited to a certain extent by the accompanying grinding apparatus. The grinding equipment must be proportionate to the welding equipment if the full value of the work of the former is to be secured. Incidentally the grinding equipment investment can be minimized and the amount of grinding work done can be greatly increased if arrangements are made for rapid transportation of grinding apparatus by autotruck, so that one grinding machine may follow up from two to three welding gangs which may be widely separated.

Rail-grinding equipment is now a necessity where it was once considered a toy, and, aside from the grinding equipment long in use by the Lorain Steel Company in its joint work, the need for grinding apparatus was not generally recognized until rail corrugation began to be troublesome. Another factor which ultimately created a field for grinders was the rather late and sudden recognition of the fact that all rail joints, no matter what their kind, must be ground. There was also a period of experimentation in connec-

tion with conflicting views over the relative merits of the rotary and reciprocating principles. All of this delayed the general adoption of grinding apparatus until it was finally found that, while each type has its peculiar field of usefulness, good results can be had by the use of both types.

#### Types of Rail Grinders—Power Tampers No Longer an Experiment

Grinding apparatus may be classified into four general type groups, as follows: 1. Rail files (push files), hand operated, reciprocating. 2. Rotary grinders, flexible-shaft type. 3. Rotary grinders, machine-type, mounted on small trucks. 4. Reciprocating grinders, machine-type, mounted on small truck or special carriage.

The rail file, manually operated, served its purpose while labor was comparatively cheap and during the period of development of machines. Its chief use was for filing or grinding newly made joints. The flexible shaft rotary grinder came into use for the same purpose. It is now confined to grinding special track work where its peculiar construction has adapted it to this difficult field. It is a costly piece of apparatus to maintain, due to the abnormal failures of the shafting, and a new grinder has recently been developed for the same work which is far less expensive to maintain and less liable to cause injury to the workmen. This machine was illustrated in the *ELECTRIC RAILWAY JOURNAL* for May 26, 1917.

The larger machine types of rotary and reciprocating grinders and their uses are so generally familiar that they need not be described more fully. It suffices to say that both types are effective and efficient and that in general at least one machine of each type may be used advantageously on almost any property. In fact some classes of grinding work can be done best by the use of both, the one supplementing the other.

Incident to the use of grinding machines is the material composing the grinding wheels or blocks. All of this apparatus except the push files (which require a form of special steel bastard file) consume large stocks



Specialized dump cars are playing an important part in modern track work

of abrasive material, and in consequence the selection of this stock needs careful attention, with the view to securing the most durable and effective material obtainable.

Tie tamping has been a bugbear with everyone who has had anything to do with track work. The time-honored custom of tamping by hand, with the tendency of the men to either "go to sleep" on each tie or else to skimp the work when pressed to wake up and cover



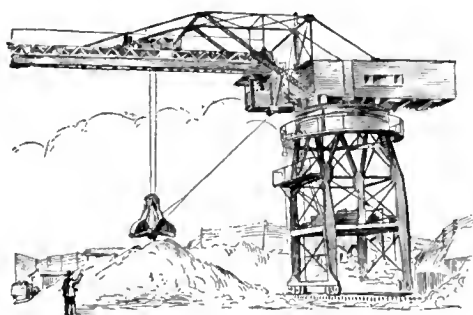
ground, has at last given way to machinery. The mechanical tie-tamping devices now on the market came to the front just in time to be of great assistance at a time of extreme labor shortage. No longer an experiment, the pneumatic and electric tie tampers have become a part of the equipment of many way departments almost over night. The pneumatic type has had the greater development and is in more general use, but there are certain points in favor of the electric type which have great merit, principally the feature of availability of power, and if the electric machine can be made to overcome some present disadvantage it may ultimately supplant the pneumatic apparatus.

The pneumatic tampers have produced savings that are remarkable. Tamping can be done mechanically for half the cost of manual tamping. The proportionate saving in men, however, is even greater, and this is a particular advantage, as the much smaller force required is also of a higher grade. The number of men required for mechanical tamping is only 30 per cent of the number required for hand tamping. In addition the tamping itself is far superior to the best hand labor.

#### Power Drilling Machines Save 75 per Cent Over Hand Drilling

Rail drilling is another field where mechanical means have been resorted to with beneficial results in labor saving. That old-time standby, the ratchet drill, has been displaced almost entirely by the electric power drill, except for emergency use and for certain classes of repair work. It has been found that the power drill will cut the cost of track work in its sphere at least 75 per cent over hand methods. By cutting down the number engaged on drilling the power drill has also released a large number of men for other work. Incidentally there is a saving in drill bits and cost of sharpening due to the uniformity of working conditions created by the use of the power machine. In hand work with ratchets there is apt to be distortion in position of bits and other parts created by careless handling which lead to rapid breakage of bits.

In connection with power drilling it should be noted that there is a new type of power-operated ratchet drilling device which is available for use wherever

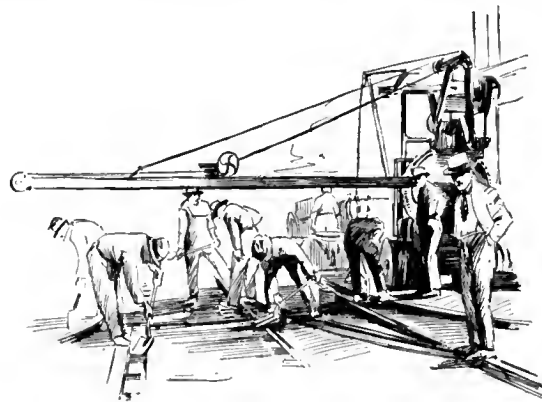


A great crane that literally "eats up" the work

pneumatic tools are used in track work. This device has the compactness of the hand-operated ratchet and is available for use in cramped space at joint repairs when the electric drilling devices cannot be used without destruction of a considerable area of pavement to make room in which the apparatus can work.

Regardless of the nature of the drilling device, the drill bits receive very rough treatment, and the high carbon steel rails in general use are particularly difficult

to drill even with the highest grade of special tool-steel drill bits. At this point the special tool-grinding machinery of the portable type comes into service. By means of special tool holders, any type of bit can be resharpened by the average laborer and the bits will do better work than if sharpened by the average machinist at a shop. There is no lost time waiting for fresh bits and a smaller stock can be carried, which is an item of moment when the present very high cost of



Track concreting à la mode

drill bits is considered. Special tool-sharpening devices of this character are now considered indispensable on jobs where more than a few holes are to be drilled, and they should be in every gang tool box.

#### Power Shovels for 50 per Cent Economy

The electric shovel has also come into quite a general use as a labor-saving device, and consideration should be given to its use at every point where the controlling conditions will permit. It is invaluable when it can be employed for breaking up concrete, in excavating and grading on extension work, and in reconstruction work where the street widths will permit. In the latter situation it can best be used when there is room for the installation of a temporary third track. These shovels have been known to save their cost in doing two miles of track work. Under favorable circumstances they will reduce the cost of excavating by 66 2-3 per cent, and cut the cost of teams 50 per cent, which latter is a very great advantage at this time, when teams are not only high in cost but also difficult to get at any price.

#### The Pavement Plow As a Man Saver—Specialized Work Cars Beat Junk

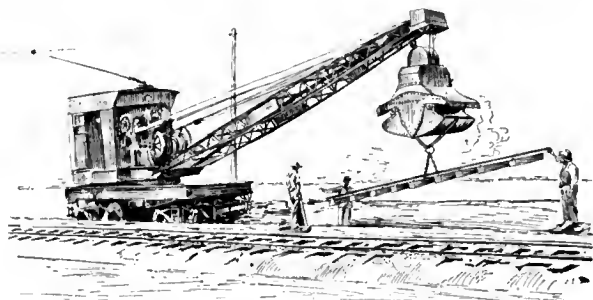
Another labor and time-saving device is the pavement plow, the use of which has greatly extended in the past two years. As an aid in the removal of block pavements of all types and with all kinds of paving joint fillers it has proven its worth as a labor saver. This device will do as much work of the most difficult kind, in an hour or less, as five men can do in three nine-hour days and for less than 25 per cent of the manual labor cost. The need for men is so great that the saving in man-energy alone would make the device worth while even if the costs were the same.

An active interest has been created in the improvement of work cars for handling materials and the shortage of men has done more than anything else to direct attention toward the need for reduction in men used in this branch of the work. Until recently most bulky material, such as paving blocks, sand, gravel and crushed stone, were handled by men, who loaded the



material onto ordinary flat cars at the yards and unloaded it again at the job. Sometimes the men were transported with the load, where there were none available at the point of unloading. From eight to ten men are usually required for this sort of work.

There was a time, not long ago, when any old collection of junk on wheels was considered good enough for a work car. In that day the way engineer who asked for specially designed work-car equipment was apt to be considered somewhat crazy. The development of the automatic side-dumping car has changed all this, much to the advantage of the companies. It is now possible to unload a 3-car train of automatic dump cars with one man, where six or eight were formerly required by such cars. The whole trainload can be dumped in from 3 to 5 min. where it formerly required about 20 to 30 minutes per car. Such equipment has



The great thing about the crane car is its ubiquity—it's always there

further advantages in the saving of time of the equipment on the road, in lessening of tie-up of passenger car traffic while unloading between cars under regular service conditions, and in availability for use in general revenue freight service in hauling material for highway contractors as well as in the railway coal service.

It has been authoritatively stated that automatic dump-car equipment has saved as much as 30 cents per foot in the cost of track work in a large city in the Central West. The locomotive crane and the pillar crane, mounted upon cars, have taken an important place in the list of labor-saving equipment. When especially designed for electric railway work they are of particular value in handling special-work installations, in loading and unloading rails upon the street, and in the general work of handling materials. As an indication of the savings which may be accomplished through use of derrick cars the table below is reprinted from the *ELECTRIC RAILWAY JOURNAL* for Dec. 23, 1916:

SAVING EFFECTED IN FOUR YEARS BY USE OF 3-TON PILLAR CRANE CAR ON ELECTRIC RAILWAY SYSTEM

Number of Tons Handled	Cost of Handling		Total Saving
	Without Crane	With Crane	
4000 tons miscellaneous .....	\$1.00	\$0.25	\$3,000.00
3324 tons load on cars .....	.75	.20	1,828.20
3324 tons to yard .....	1.00	.25	2,493.00
6340 tons unloaded .....	.50	.20	1,902.00
6340 tons to job .....	.75	.25	3,170.00
			\$12,393.20
Cost of crane car, ready to run .....			\$7,000
Depreciation 5 per cent, four years .....			1,400
Interest 5 per cent, four years .....			1,400
Upkeep 2½ per cent, four years .....			700
Net saving four years, one car .....			\$3,500.00
			\$8,893.20

In connection with the subject of dumping cars it may be well to call attention to a phase of the work of handling materials where there is room for the development of mechanical means which will save a great deal of labor. We have reference to the need for some

form of power loading device which can be used in the confined areas of narrow city streets, alongside track trenches, for the purpose of placing the excavated materials upon the cars, thus lessening the amount of manual labor which is still employed for this purpose. Both grab buckets with cranes and electric shovels may be used to a limited extent in this way, but street conditions more often prevent this.

The subject is being studied in several quarters and there is no doubt that once the attention of manufacturers of several types of automatic loading devices now used extensively in coal yards for loading coal from the piles into wagons is called into active consideration of the field waiting for development we may expect to see a satisfactory solution of the problem.

### Air Drills and Skull-Crackers for Concrete

In removing old track prior to reconstruction it is often necessary to remove a concrete paving base. Several methods have been adopted recently to do this work mechanically in order to replace the old method of digging jack holes, raising the track and breaking down the concrete with heavy mauls. This method is tedious, requires a great many men and is liable to cause serious disturbance to adjacent concrete under roadway pavement which is to be left in place. Such disturbances lead to excess cost of concrete for the new track because of the necessity for breaking out and replacing shattered concrete.

In this field there have been two developments, each of which is effective in saving of labor. One is the use of air drills in connection with compressor apparatus available for operation of tie tampers. With four air drills a gang of six men can remove as much of the hardest kind of track concrete in a day as a gang of fifteen men can accomplish manually, using heavy bull punches, jacks and mauls.

Another method is to utilize the so-called "skull cracker," which is a heavy casting weighing about a ton, attached to simple derrick, moving on the track and so rigged with a release trigger as to drop the casting from a height of about 12 ft. onto the concrete. It has been reported that this comparatively simple device has effected a saving of from 15 to 20 cents per foot of single track in labor cost of this work. The "skull cracker" is moderate in first cost and is available in many cases where there is no air equipment suitable for operating air drills.

### Concrete Mixing Machinery Will Save Its Cost Many Times Over

There has been a rapid development in the application of machinery to mixing concrete and cement grout for track pavement work. This has been assisted, particularly in the case of mixers, by the change in opinion as to the practicability of machine mixing compared with hand mixing. There are at least two mechanical grout mixers now on the market which are acceptable to highway engineers. In fact, one of these had the advantage of being developed by its manufacturer under the direction of a board of experienced highway engineers with gratifying results. It is now possible with the mechanical mixer not only to save materials and secure a high uniformity of mixture, but also to save from 3 to 5 cents (42 to 70 per cent) per square yard in the labor cost of mixing. In addition a mechanical

grout mixer will follow up and complete the grouting of all the pavement which can be laid in a track job in any one day under ordinary conditions. The advantages in completing the grouting so quickly are apparent.

In the concrete-mixing field the development has branched in three directions: (1) In the increasing use of the moderate-sized batch mixer; (2) in the adoption of very large-sized batch mixers with self-loading hoppers, mounted upon trucks and self-propelling, generally upon the track and sometimes on the roadway surface alongside, and (3) in the assembling of complete and rather complicated mixing plants upon a train of two or more cars.

Each of these methods has its field and has proved very successful. For all round use, particularly because of its mobility, the small batch mixer operated by a gasoline engine may be considered the most serviceable, especially in view of the fact that the cost of this machine is very moderate.

The larger, self-propelled mixers are more for use on very large jobs where a large volume of concrete must be produced rapidly. It has been observed that one, or at the most two, of these machines will serve very extensive reconstruction programs on systems of the greatest size, and the output of such machines by the mixer manufacturers for railway customers has so far been somewhat limited. To some extent this restriction may be due to the prevailing custom on many systems of letting the track-paving work out to contractors who usually have the paving work for the city. This is often being done in conjunction with the railroad track work.

The special concrete mixing plant mounted on trains of cars has been used in but few instances and interest in this type of plant has been revived by the action of the Denver Tramway Company in selecting it for that property, as described in the *ELECTRIC RAILWAY JOURNAL* for Oct. 6, 1917. The particular advantage claimed for this equipment is in the elimination of the storage of any concreting materials on the street. This does away with a large amount of labor required for handling, obviates complaints from property owners fronting the work and tends to preserve the cement from theft and from damage by the elements.

From the foregoing it will be observed that the railways are alive to the fact that concrete mixing machinery, when properly selected, will save its cost many times over, and there is no reason why every property should not take advantage of some one of the several types of apparatus which are available.

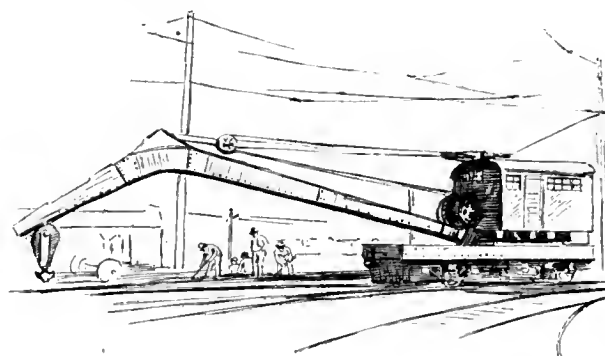
#### Kerosene Torches and Asphalt Surface Heaters

During the winter season there is a great amount of labor expended in keeping switches, switch-operating mechanisms and interlocking free of snow and ice. In this work the kerosene torch has come into use and it has been found that one man equipped with such a torch will displace from three to five men and do better work. These torches have other uses which make them serviceable the year round. They are indispensable in connection with the work of resetting hard-center plates in special track work.

Where there is a considerable amount of asphalt pavement in tracks the asphalt surface heater or burner is effecting large economies in men and materials. It consists of a set of five or more burners using kerosene

and arranged on a carriage which also has a sheet-iron hood, about 4 or 5 ft. square, over the burners. The burners and hood are very close to the pavement surface, so that the heat is concentrated and the flames are protected from the wind. These heaters are used to soften the asphalt surface where it is desired to fill up worn areas which have not exposed the concrete. By their use the cutting out of much good surface material is avoided, as it is only necessary to add more material on top of the old material, after sufficient heating, and to finish the surface by rolling or tamping. Specially shaped hoods and heaters have been devised for use in repairing narrow ruts in asphalt along the rails, and by their use a saving of 50 cents per square yard of pavement surface has been effected.

These heaters have also been used to great advantage in heating cobble and block pavement in extreme



In popularity the crane car heads the list (see pages 522 and 523)

cold weather preparatory to its removal for emergency track repairs, and have made possible the making of repairs in three or four hours' time which would have otherwise consumed a day.

#### Methods of Cutting Asphalt Surface

It is often necessary to remove sheet asphalt entire for new track construction or for reconstruction. There have been at least three recent improvements in methods of doing this work which have been described in these columns. Each of them does away with the onerous and expensive method of cutting manually with the asphalt matto. One method involves the use of a special cutting tool designed to operate with the air-operated tie tamping machine, as described in the *JOURNAL* for June 30, 1917. Another utilizes an ingenious arrangement of a cutting wheel mounted in outrigger fashion upon a work car (see *ELECTRIC RAILWAY JOURNAL* for Jan. 20, 1916).

Still another plan involves the use of a tee-iron with a cutting edge laid upon the surface and made to cut by operating a small road roller over it. (See *ELECTRIC RAILWAY JOURNAL* for July 7, 1917.) Again, the work has been accomplished by mounting special cutting edges completely around the circumference of the rear roller of a small tandem road roller and running the roller over the area to be cut.

Each scheme has a good deal of merit, and any one of them will be found clearly in the labor-saving class. For instance, the air-operated cutting device is reported as having worked at the rate of 47 feet per hour. It would take one laborer several hours to do the same work manually.

The oxy-acetylene cutting flame or torch has proved

to be effective as a time and labor-saving device. It is now used extensively in the work of removing old rails, replacing the chisel and sledge in cutting bolts at joints and replacing hack saws for cutting rails into short lengths prior to loading on cars. It is also of great service for cutting the ends of frog arms and other special work made of manganese steel, which is almost impossible to cut by any other method. There are many other uses to which this tool may be put, and these illustrations serve to call attention to a piece of apparatus which is almost indispensable as a part of the labor-saving equipment of the way department.

There has been a great deal of interest during the past year in connection with the possibilities for labor saving which are presented in the storage yard of the

way department. Until a short time ago most yards consisted of a lot of nondescript tracks with partly worn-out rail and special work and a number of cheaply constructed gin poles or stiff-leg derricks scattered about largely at random, and with comparatively few installations of modern types of traveling cranes, derricks and other equipment of adequate design. This was perhaps the result of spasmodic growth from small beginnings, which prevented the consideration of the subject from an economical viewpoint. A great many yards have not been located to the best advantage with respect to the radius or center of distribution in combination with the sources of original supply.

The labor shortage has led to a renewed consideration of the whole subject, and a number of articles

[Supplement

## How Way Engineers Rate Labor-Saving

**I**N order to permit the compilation of the experience of way engineers on the subject of track tools and other appliances, the editors of the ELECTRIC RAILWAY JOURNAL asked a number of them to telegraph or write briefly their answers to the following questions:

1. What piece of special machinery or special tool has been the greatest labor saver on your property or properties in way department work?

*From J. M. LARNED, engineer maintenance of way, Pittsburgh (Pa.) Railways:*

In regard to the relative importance of different pieces of track equipment, I would arrange them as follows: Question 1—Crane car. Question 2—Arrange in this order: crane car, electric shovel, air tamper, concrete mixer, stone crusher, dump car, arc welder, rail grinder, ballast spreader, track drill, acetylene torch.

*From A. E. HARVEY, engineer maintenance of way Kansas City (Mo.) Railways:*

All things considered I believe that our crane car has saved us more in labor than any other one piece of equipment, but I believe that there are several other kinds of equipment that are just as necessary to the accomplishment of the work in an economical manner. As to the second question I do not believe that a fair comparison can be made as to the relative economic value of the devices mentioned, as each is suited to its particular kind of work. Where such work predominates the machine that is fitted for it takes precedence in an economic sense over all other equipment. All of the devices mentioned are such great labor savers that where there is any con-

siderable quantity of work to be done to which they are adapted they are just as essential to the proper handling and economical conduct of the work as are the most common hand tools. They should, therefore, not be considered as special tools but just as necessary a part of the outfit as a pick or shovel.

*From W. R. DUNHAM, JR., engineer maintenance of way, Connecticut Company, New Haven, Conn.:*

The crane car has been the greatest labor saver on this property. In order of importance the devices listed in the second question might be arranged as follows: Crane car, arc welder, air tamper, power drill, electric shovel.

*From H. M. STEWARD, chief engineer Boston (Mass.) Elevated Railway:*

In answer to your request would state that the arc welding outfit to be the most useful apparatus. I should arrange in the following order the list given in question 2: Arc welder, crane car, power drill, air tamper, automatic dump car, electric shovel, concrete mixer, pavement plow, concrete breaker, acetylene cutting flame.

2. What is the order of merit as labor savers of the following tools or devices: Arc welder, power drill, electric shovel, air tamper, concrete mixer, crane car, automatic dump car, pavement plow, concrete breaker, stone crusher, acetylene cutting flame?

Telegrams and letters were received from a number of companies and these are summarized as follows:

*From J. P. RIPLEY, railway engineer J. G. White Management Corporation:*

Taking all in all it is my opinion that the electric welding machine has been the greatest labor saver in the track department. It saves materials as well as labor. Instead of renewing a frog, for instance, the points can be rebuilt by welding. Your second question is difficult for us to answer because conditions vary on our different properties. We think the welding machine comes first and a concrete mixer is considered generally a necessity and might come second, and the same is true of the power drill.

We have not as yet given the pavement plow a trial and usually purchase stone already crushed for ballast. We have not tried the electric shovel or the air tamper but believe the latter at least has great possibilities.

*From E. A. WEST, chief engineer Denver (Col.) Tramway:*

Answering question 1, I should put arc welders first. I should arrange the equipment in question 2 in the following manner: Arc welder, acetylene cutting flame, air tamper, crane car, concrete mixer, portable stone crusher.

bearing on the matter were published in this paper in the early part of 1917 which brought out a good deal of information. Particular interest was developed in the description of the important yard improvements made at Cleveland and at Denver, where two quite distinct methods of handling materials and types of yard layouts were compared. The Cleveland installation was described in the JOURNAL for Feb. 24, 1917, while the Denver plant was the subject of an article in the issue for Oct. 27, 1917.

These two articles in particular served to emphasize the importance which the storage yard itself, its location and its handling problem have assumed. At the same time they presented definite facts which indicated the large saving in labor which must always result

from a concerted effort to improve conditions in this quarter.

This is well illustrated by the statement made in the Denver article, in which it is stated that with the new yard layout three men can handle as much material as fifteen could handle in the old yard. At Cleveland one item of unloading a car of granite, for instance, showed a 25 per cent reduction in labor cost.

While it is quite clear that no one best way will be found to handle materials most economically on all properties there is no doubt but that the locomotive crane has been found to be one of the most useful pieces of apparatus for this sort of work, suitable alike to large and small yards and having other uses out on the road which make it a profitable investment.

Article by R. C. Cram]

## Appliances for Use in Track Work

*From FORD, BACON & DAVIS, New York City, for several properties operated:*

*Ithaca (N. Y.) Traction Corporation*—The rotary sweeper for removing snow has been the greatest labor saver.

*Central New York Southern Railroad, Ithaca, N. Y.*—The acetylene welding torch is the most useful device.

*Lackawanna & Wyoming Valley Railroad*—This company operates under steam road conditions and as the questions pertain almost exclusively to street work no answers of value can be given. The company understands, however, that the air-tamping devices are being used on steam roads with good results.

*Empire State Railroad Corporation*—The acetylene cutting flame is considered by this company to be the most efficient of all the labor-saving devices listed.

*United Railroads of San Francisco*—The crane car has been the greatest labor saver in our way department. We would arrange the list in question 2 as follows: Crane car, air tamper, automatic dump car, pavement plow, electric shovel, power drill, arc welder, concrete break-

er, acetylene cutter, portable stone crusher. We are now ordering a concrete mixer which we hope to rank about fourth in the above list.

*From C. G. KEEN, engineer way and structure American Railways Company, Philadelphia, Pa.:*

As you know I am not in close enough touch with actual operating conditions to reply in respect to the labor-saving features of the tools mentioned. In respect to their values in maintenance work, however, I would place the arc welder in connection with the grinding machine easily first in importance.

*From F. H. HILL, general manager Elmira Water, Light & Railroad Company, Elmira, N. Y.:*

Replying to your inquiry I should place the pneumatic tie tamper at head of the list as the greatest labor saver in construction work. As to the list in your second question I should arrange the order as follows: The air tamper, arc welder and acetylene cutting flame are all indispensable. Power shovel and concrete mixer are necessities on construction work of any appreciable size. We do not have the other devices listed. A rail grinder in con-

nection with a welder certainly prolongs life of track and equipment.

*From CHARLES H. CLARK, engineer maintenance of way, Cleveland (Ohio) Railway:*

On this property we are agreed that the pavement plow is the greatest labor-saving device that we have. It not only saves a large amount of labor but accelerates the work. To arrange the tools in your second question in order of merit is a rather hard proposition, for some tools are dependent upon others for their efficiency. However, this order may be suggestive: Pavement plow, crane, automatic dump car, concrete breaker, concrete mixer, acetylene cutting flame, electric shovel, power drill, air tamper, arc welder, stone crusher. An explanation is due in connection with this list. All of the devices are labor savers. A stone crusher is not necessarily a labor-saving device, it might more properly be called an economical machine. One might not need an acetylene torch but it will cut rails faster than twenty men can do. An electric shovel might be a poor adjunct unless there were sufficient work for it. We find use for two shovels. The arc welder is a necessity.

## Summary

THE answers to question 1 indicate that, as far as this questionnaire is concerned, the crane car leads and the arc welding apparatus is a close second. The acetylene torch comes next, and there is honorable mention for the pavement plow and the pneumatic tamper.

A summary of the answers to question 2, weighting each in accordance with the number of votes, gives the following as the order of preference: 1—crane car; 2—air tamper; 3—arc welder; 4—auto-

matic dump car; 5—concrete mixer; 6—pavement plow; 7—electric shovel; 8—power drill; 9—acetylene torch; 10—rail grinder; 11—stone crusher; 12—ballast spreader.

It would be unscientific to conclude that this list is at all conclusive—first, because only a few excellent devices were listed; second, because the canvass was only partial. The list, however, is suggestive, and will be useful in directing attention to the fact that way engineers appreciate the value of tools.

# Better Car Maintenance an Urgent Necessity

**Electric Railways Should Have First-Class Talent in Charge of Shop Repairs and Should Spend More Money on Maintenance—The Equipment Department Should Be the Training School for Most Other Departments**

*By M. B. Lambert*

Assistant Manager Railway Department, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

**T**HE winter months which have just passed were the most severe on electric railway equipment that have been experienced in a number of years. About the middle of the winter many properties found themselves seriously crippled, with 35 to 40 per cent of their cars out of service, due to all kinds of equipment failures. Some of the larger properties had as many as 450 to 500 crippled cars at one time. Prompt repairs were impossible, due in part to a shortage of experienced armature winders and car equipment mechanics and in part to the difficulty of getting promptly the great amount of repair material that was necessary. Neither the railway companies nor the supply manufacturers were prepared for any such emergency.

The situation was a most trying one for the industry as a whole, and especially so where increased fares were being introduced. The people were agitated about the increased fare, and their demands for better service were more pronounced than ever. The severe weather made it impossible for the companies to provide anything like the usual service, and, incidentally, every passenger that had to suffer inconvenience became far more impatient and critical than usual. As a result, the public in many localities are more resentful than ever toward the public utility corporations. A solution for this trouble must be found and steps must be taken during the coming summer so as to prevent a repetition of this situation as far as possible.

## The Maintenance Department the Last to Be Considered

One thing that appears quite evident is that more consideration must be given by operating executives to the maintenance of car equipments, since one of the biggest factors in securing the good-will of the public lies in providing reliable service. It is probably true that the average operating executive gives far less thought to his maintenance of equipment problem than he does to the numerous other perplexing questions with which he is obliged to contend throughout the year. When the great importance of having first-class talent in charge of shop repairs and maintenance, as well as providing adequate facilities, is mentioned to him, he will invariably assent, but will point out that, under existing conditions, his company is not in a position

to pay such salaries and cannot afford to provide such facilities as the big companies do, etc.

Some of the fairly large companies do have first-class men in charge; but, as a rule, these men do not have the money to do all the things they know should be done. The result, in both cases, invariably shows up in the form of unreliable and interrupted service, causing far greater criticism from the public than curtailed but reliable service would cause. In other words, it would appear to be better to economize by less frequent service but to have the equipment that was in operation so well maintained that it would be as reliable as possible.

## The Experience Last Winter Should Teach a Lesson

The general breakdown that occurred this winter will, without doubt, result in a change of attitude on the part of many operating executives regarding their equipment maintenance department. As a rule, one of the first departments they think of, when further reduction in expense must be had, is the shop maintenance, and orders are issued to reduce expenses there when it ought to be about the last resort. Perhaps the reason for this is that it is always possible for a company to cut down expenses there with less commotion or immediate effect than in some other departments. However, it would appear that greater discretion should be exercised in the future, especially during the fall months, when equipments are being put in shape to withstand the winter storms.

The average man will defer painting his house or his automobile and other similar things until he is financially able to do so, but he knows that if he neglects the plumbing or heating outfit, he will have serious trouble and that, in such maintenance, a stitch in time saves nine. The maintenance of the propulsion equipment on cars comes under the same category. That it has not, except in a few cases, received proper consideration is evident when an analysis is made of the whole country, and shows that a very large number of railway properties do not have adequate maintenance facilities nor adequate maintenance organizations. Moreover, the average master mechanic is underpaid and his job is not as attractive as it ought to be, largely because many operating executives have not, as previously mentioned, heretofore given to this phase of their problem its proper consideration.

Finally the fact that there are very few men available who are fully competent to handle the maintenance



Which kind of master mechanic is preferable?



## A Kilowatt-Hour and the Coal Required to Produce It

Discussion at Manila, P. I., Brought Out Concretely the Losses Which Occur in Transforming the Energy in Coal Into Electrical Energy

**A**T A RECENT meeting of the electric railway company section of the Manila Electric Railroad & Light Corporation, B. H. Blaisdell, chief engineer of power plant, described graphically the ways in which losses occur as the stored energy in coal is transformed into electrical energy. To make his story tangible he exhibited a lump of coal from which he removed a portion as he discussed each individual loss. Some of the more striking passages in his talk follow.

Most people have a fair idea of what they will get when they ask a storekeeper for a meter of cloth or a kilo of potatoes, but there are few who have any conception of the nature and magnitude of a kilowatt-hour, other than that is 30 centavos' worth of electrical energy. This is because electrical energy cannot be seen.

Its value must be appreciated by observing what it can do. For instance, a 40-watt incandescent lamp can be burned from 6.30 to 10 o'clock each evening for a week with a consumption of 1 kw.-hr.

To produce this amount of energy requires, in the Manila plant, 3 lb. of coal, the cost of which is more than 75 per cent of the total cost of producing the energy.

Coal is, of course, simply compressed and mineralized

*(Concluded from page 524)*

of equipment shows again that this extremely important part of the industry has been more or less neglected. If the positions of master mechanics were more attractive on the majority of roads, there would be, without doubt, a tendency for men with more or less technical ability to endeavor to fit themselves for such positions, but they are not doing so now.

### The Maintenance Department the Place to Develop Young Men

It is true that a few operating managers have interested themselves sufficiently in this subject to see that they had one or two promising men coming along in the organization who would be developing themselves for better and more responsible positions. But there are very few railway companies in this position. The majority of roads have one man they call master mechanic, and if he drops out for any reason whatever they are usually up against it until they find some other man who will, in some measure, fill the bill.

In the writer's opinion the equipment repair and maintenance department should be the training school for most other departments on the railway. Technically educated young men (preferably young men who are educating themselves) should be induced to work in the shops with the understanding that opportunities are open to them to advance into the traffic and transportation departments. This plan should bring about a condition whereby the men of promise, coming along in the organization, will have had a good mechanical training and will always appreciate the value of properly maintaining the rolling stock.

vegetation. One of its earliest forms was peat, from which great pressure squeezed the moisture and high temperature drove off more or less of the volatile combustible constituents. Thus were formed lignite, bituminous coal and anthracite. The first named, lignite, still contains much moisture and volatile combustible matter, bituminous coal contains less of these, while anthracite is almost wholly fixed carbon.

A lump of coal has stored within itself sufficient energy to lift it a distance of 2000 miles, but of this energy only about 10 per cent is converted into the electrical form in the usual power plant. The remaining 90 per cent is lost in a number of ways as follows.

### LOSSES IN THE POWER PLANT

In the first place, coal is rarely dry, but as the Manila company buys coal according to its heat value coal containing 10 per cent of moisture would cost 10 per cent less per ton than if it had been dried. However, a real loss due to moisture occurs in the furnace because some heat must be consumed in evaporating it. Except in the rainy season this amounts locally to about 1 per cent.

The second loss is from coal and coke falling through the grates. While this loss can be reduced by the use of minimum width of air spaces between grate bars and the elimination of unnecessary stirring of the fuel bed, the loss may be from 1 to 10 per cent. Locally it is about 1 per cent.

A third loss is from incomplete combustion, with production of smoke and carbon monoxide. This is mainly caused by poor draft, excessive thickness of fire, careless firing and faulty furnace design preventing proper intermingling of the fuel gases with air. It may be from 1 to 5 per cent, and in the Manila plant is about 1 per cent.

The fourth loss, the greatest of all occurring in the boiler plant, is that through the flue gases. In a natural-draft plant, like that at Manila, it is necessary to lose about 15 per cent of the heat to maintain the draft. Even with forced draft some energy would be used in driving the fans. There are also some unnecessary losses in the flue gases caused by the admission of excess air to the furnace (either through the grate bars or through infiltration through the boiler setting), scale and soot on the boiler tubes which permit heat to escape which should be absorbed by the water, deranged damper walls in the boiler which may allow the hot gases a short-cut to the flue, etc. In Manila these losses total about 5 per cent, making a total flue-gas loss of 20 per cent.

The fifth and last important heat loss in the boiler plant is from radiation from exposed boiler surfaces, piping and settings. While this may be reduced by proper lagging, it, with sundry minor ones, amounts to about 7 per cent.

Thus in the local plant about 30 per cent of the total heat in the coal is lost in the boiler room.

### LOSSES IN THE TURBINE ROOM

Of the 70 per cent of the energy originally in the coal which comes to the turbine room, some must be used in driving pumps for circulating condensing water, removing air and condensate from condensers, feeding water to the boilers, cooling the oil, furnishing

water to glands, etc. In Manila the auxiliary machinery takes approximately 16 per cent of the heat in the coal. Of this, however, more than a third (6 per cent) is returned to the feed water in the heaters, leaving 60 per cent of the original energy to be accounted for.

Next, heat is lost in radiation from the turbine casing, friction in bearings, internal losses in the electric generators and in excitation, and these amount in all to about 10 per cent of the total heat in the coal.

The last and greatest of all the losses occurring in this system of generating power is in the exhaust steam discharged from the turbine into the condenser, carrying with it 40 per cent of the total heat in the coal. This heat is absorbed by the condensing water and is carried away. The loss is necessary on account of the limited heat range through which steam can be worked. Increasing the initial pressure or the temperature of the steam in the boiler to begin with, and reducing the pressure or temperature in the condenser to end with, will increase the range of expansion of the steam so that more energy can be produced from it. However, there is a limit to the pressure or temperature at which it is safe to operate boilers, and there is a limit to which the pressure and temperature can be reduced in the condenser.

#### THESE FIGURES FURNISH NO CAUSE FOR DISCOURAGEMENT

Although, as Mr. Blaisdell pointed out, the local company pays for ten times the energy in the coal which is transformed into electricity, there is no reason to be alarmed but rather encouraged, because during the last two years the local power plant has reduced its coal consumption per unit of electrical energy by more than 15 per cent. A goodly part of this was brought about by the increased operating efficiency of power-plant employees. This point was emphasized, in the discussion of Mr. Blaisdell's paper, by J. P. Ripley, railway engineer J. G. White Management Corporation, who pointed out some of the lines in which further savings can be secured. He referred particularly to the use of higher boiler pressure and of powdered fuel. Another great possibility is in the production of by-product coke. Mr. Ripley had also a good word to say for the Diesel engine.

Comparing the local fuel consumption of 3 lb. of coal per kilowatt-hour with the 1.75 lb. of some plants, he said that the former figure was not by any means discreditable. The latter plants probably have larger generating units, use higher boiler pressure, are able to secure cooler condensing water, the auxiliary equipment may be of a more elaborate character and the fuel itself may be of a higher heating value.

#### New York Commission Issues Report

The Public Service Commission for the First District of New York has just issued Volume 1 of its report for the year ended Dec. 31, 1916. Besides the usual statistics, which were abstracted in this paper when the commission made its 1916 report to the Legislature, the volume contains an extensive résumé of the rapid transit construction program in New York City and the progress of the work. Many illustrations are used to show details of construction work under the various contracts.

## AMERICAN ASSOCIATION NEWS

### War Board Transacts Routine Business

A MEETING of the American Electric Railway War Board was held in Washington on March 8. Those in attendance were Messrs. McCarter, Budd, Brady and Gadsden. Charles L. Henry, Indianapolis, was also present by invitation. The appointments of E. C. Faber, manager, and W. V. Hill, assistant manager of the board, mentioned last week, were confirmed. Mr. Hill was also appointed electric railway representative on the fuel administration staff in place of Colonel Moore.

Announcement was made that the fuel-saving posters prepared by the Fuel Administration had been distributed to the electric railways. Altogether 280,000 of these posters have been sent out to electric roads, namely, 10,000 of the "firemen" poster, 20,000 of the "Uncle Sam" poster and 250,000 of the "Eagle" poster. The latter is the one put up in the car vestibules. All the expenses of issuing and distributing these posters were defrayed by the Fuel Administration.

Mr. Budd, the member of the board in charge of traffic matters, made a report to his associates of the progress on this work, and Mr. Faber made a detailed report. The next meeting of the board will be held in Washington on Friday, April 5.

### Delegates to Chamber of Commerce Convention

PRESIDENT STANLEY has announced the appointment of ten delegates to the convention of the United States Chamber of Commerce in Chicago on April 10-12. P. H. Gadsden will be chairman of the delegation and representative of the association on the national council. The other delegates are: Thomas N. McCarter, H. H. Crowell, J. K. Choate, L. S. Storrs, Thomas Finigan, James H. McGraw, Britton I. Budd, A. W. Brady and Walter A. Draper.

### Good Judgment More Important Than Strict Obedience to Rules

A SENTENCE found in the rule book of many railway companies reads as follows: "Use judgment and discretion in all matters pertaining to your duties."

The daily papers in a Middle West city commented favorably the other day on an incident brought about by a storm blockade there. One of the few electric railway cars which had been able to get through reached a point where the crew had been instructed to turn back. The order "All out, take the next car" was given by the conductor to his passengers. The usual remonstrances arose and the conductor saw for himself that there had been no car for some time and none was in sight behind. "All right, get aboard," he said, "I'm not going to let you people freeze—orders or no orders."

The railway president was asked by a reporter if he would discipline or commend this conductor. "I shall commend him," he said. "That was an exercise of judgment under unusual circumstances which I wish more employees would imitate. He acted correctly."

# CONSTRUCTION, MAINTENANCE AND EQUIPMENT

SHORT WORTH-WHILE ARTICLES FOR THE ENGINEERING AND MECHANICAL DEPARTMENTS WHICH SHOULD PROVE HELPFUL IN DEVELOPING ECONOMICAL PRACTICES IN SHOP, TRACK, LINE AND POWER HOUSE

## Special Work Designed to Give Longer Life

BY W. L. WHITLOCK

Office Engineer the Denver (Col.) Tramway

A NEW type of special work which represents a radical departure from the standard construction of the Denver Tramway was recently installed at a downtown intersection in Denver. This layout, shown in the accompanying illustration, has been termed the "outside" switch. The construction is 100 lb. contin-



NEW DESIGN IN SPECIAL WORK USED ON DENVER TRAMWAY

uous joint A.S.C.E. rail, the casting being held by  $1\frac{1}{8}$ -in. heat-treated bolts with lock nuts. The unusual feature of the "outside" switch is that main-line traffic does not operate over the switch tongue, the only time when this is actually under traffic being when a car takes the curve. The labor of maintenance and danger of derailment are reduced and the life of the switch is increased, as the stock rail rather than the switch tongue carries the wheel load.

It will be noted that there is an offset in the stock rail to make provision for the switch point when open for the curve. This offers the one objectionable feature of the layout as the wheel flanges strike the offset when cars are leaving the switch. The trouble is due to the fact that it is impossible to put a guard on the mate to pull wheels away from this point. Wheels running out of the switch and striking this offset have gradually

shaped the point off until it no longer offers an obstacle for wheels to strike. A few broken flanges resulted at first, but no trouble has been experienced since the point has worn down and future construction will eliminate this trouble entirely.

## Convex Versus Concave Bonding Compressor Screw Terminals

The Author Concludes That Each Form of Screw Point Is Suited to Certain Kinds of Bond Terminal

BY G. H. MCKELWAY

Engineer of Distribution Brooklyn Rapid Transit System

ASK the average electrical or track engineer what kind of point is used on the screws of the bonding compressors operated on his road and, unless he will admit that he does not know, he will generally say "The ordinary kind," or something similar to that. Very few persons have noticed that there are two distinct and opposite types of these points. They can be most easily described by saying that one is convex and the other concave.

The compressors made by three large manufacturers of this equipment have convex ends to the screws, while those made by two other such companies have concave ends. The compressor of one of the latter companies has a point in the center of the cup for the purpose of helping properly to center the compressor on the bond terminal, while that of the other has no point, the center of the cup being flat. With the latter reliance is put upon the sides of the cup for bringing the compressor into the proper position.

The theory upon which the cone-pointed screws are designed is that the points of the compressor screws, where fitted with convex studs as in the case of those of the three manufacturers first referred to, will enter the bond hole slightly, forcing their way through the copper terminals of the bonds and spinning the copper outward so as to compress it tightly against the sides of the holes. Here it will come into the most intimate possible contact with the steel rails, thereby making the contact resistance very low. The copper is spun closely against the rim of the bond hole, sealing it and preventing the entrance of moisture, which would tend to oxidize the metals and cause the contact resistance to increase with age. Above the edge of the rail the copper which is pushed out by the pointed screw helps to form the button which is driven down closely on the rail by the shoulder of the stud.

The idea back of the cup-shaped stud, on the other hand, is to fill up the hole in the rail by forcing the

copper in the terminal straight ahead into the hole. The sides of the cup and the collar around the end of the screw prevent the copper from spreading out too far at the sides and thus direct all of the surplus metal into the hole.

Which is the best type to use? There are good arguments in favor of both. It is probable that with the ordinary drop-forged terminal, when well made, a closer contact between the rail and the bond terminal can be made with the convex type. The reason for this is that the cup-shaped terminal tends to compress the copper in the end of the terminal and harden it so that the pressure inside the hole is not as strong in forcing the copper against the sides as when it is spun outward in the manner explained for the convex terminal.

On the other hand the spinning motion given to the terminal by the convex point will tend to crack a poorly made drop-forged terminal. This leaves long cracks extending from the circumference of the ter-

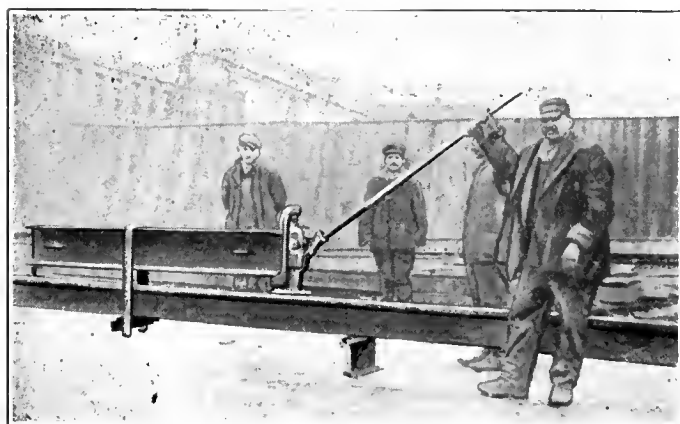


FIG. 1—SURFACE-BEND STRAIGHTENER PLACED AS IN SERVICE AT SPRINGFIELD

minal nearly to the center, and moisture may work in and destroy the contact. The material from which some bonds are made is very susceptible to these cracks, although soft enough to be more easily and efficiently driven into the hole by the cup-shaped compressor than is the ordinary drop-forged terminal. It would therefore seem wisest to employ that form of compressor with this particular type of bond and the convex type with other bonds unless there is no question as to the softness of the metal in the terminals.

One other objection may be raised against the use of the cup-shaped point in that the edges of the cup, although carefully hardened by the makers, may become broken and in this condition will badly tear the bonds. This can and always should be remedied at once by turning up the end of the screw, but there is the difficulty that many shop men cannot properly harden the metal again. If the hardening is not properly done the same trouble will soon occur again, especially if the end of the screw is allowed to grind against the rail at the time when the bonds are being compressed.

The collar around the screw of the concave-end type is so heavy that it cannot be damaged in that way and is, for that reason, not exposed to the same trouble as the point.

## A Cure for Surface-Bent Rails

Apparatus Quickly and Economically Removes Irregularities in Track Without Taking Up the Rails

BY H. K. SULLIVAN

Roadmaster Springfield (Mass.) Street Railway

FOR about a year surface-bent rails on the Springfield Street Railway have been straightened effectively by the equipment illustrated. This device, which is quite simple and costs less than \$40 to develop, was designed by the writer with the assistance of two of the track foremen associated with him. As shown in Fig. 1 it consists of a combination of I-beam, U-strap, keys and 15-ton Barrett jack by which pressure of about 60,000 lb. can be applied to the rail section.

A 12-in. I-beam 8 ft. long is provided with a welded fork at the right-hand end and designed to receive the working surface of the jack. This fork is made up of two 5½-in. x 7⁄8-in. x 7⁄8-in. pieces of steel welded to the

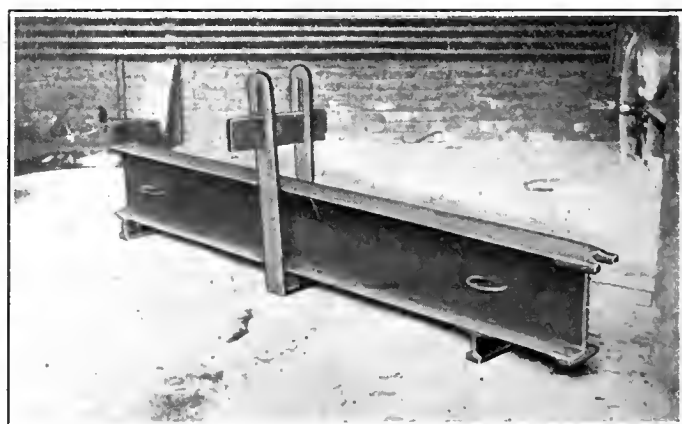


FIG. 2—DEVICE FOR REMOVING SURFACE BENDS IN ELECTRIC RAILWAY TRACK

top of the girder. At the opposite end a short transverse piece of 60-lb. A. S. C. E. T-rail is welded to the base of the I-beam and serves as a fulcrum, a second short piece of T-rail being welded to the base near the right-hand end to serve as a pedestal. Experience has also shown the desirability of reinforcing the center of the I-beam with two 10-in. x 3⁄8-in. x 5-in. steel plates welded diagonally to the web and top, as shown in Fig. 2. Four handles or elliptical rings of 5⁄8-in. wrought iron 5 in. x 2 in. in diameter are provided by means of which four men can easily lift the device from a work car and carry it to the job.

The U-strap is about 32 in. high, 3 in. wide at the bottom (Fig. 2), and offset to a width of 4¼ in. at the upper part to provide for slotting and insertion of the wedges. The inside width of the U-strap is 7 in., the two sides being 7⁄8 in. thick each, and the keys taper from 7⁄8 in. at one end to 3¾ in. at the other. The working slot for the wedges is 9 in. deep and about 1 in. wide, the keys being 15⁄16 in. thick. In Fig. 2 the U-strap is shown inverted as compared with Fig. 1. It can be used either way, but the adjustment below a piece of rail in service is made easier when the keys are driven in at the bottom, as indicated in Fig. 2.

In using the equipment, the ground is usually opened about 6 ft. on each side of the joint. The I-beam, straps and keys are put in place, and the rail is jacked up to



## New York Railways Convert 439 Cars to Prepayment Type

Over \$250,000 Saved by Revised Method of Construction—Folding Doors and Steps, Fare Boxes and Coasting Recorders Installed

THE New York (N. Y.) Railways Company is converting 439 box-type open-platform cars to the prepayment type with folding doors and steps, the control of which is interlocked with the motor circuit so that the cars cannot be started while the doors are open.

The old open-platform cars are of wooden construction throughout and weigh 28,850 lb. light. An end view of this car is shown in Fig. 1. The over-all width is 7 ft. 9 in. and the over-all length 37 ft., with a platform measuring 4 ft. 6 in. over the bumpers. The cars are double truck, equipped with two GE-57 motors, K-27 GE controllers and Westinghouse air brakes. All seats are arranged longitudinally, covered with carpet and the seating capacity is thirty-six. The successive steps from the ground to the car floor are 14 in. to the first step, 12 $\frac{3}{8}$  in. to the platform and 8 $\frac{1}{4}$  in. to the car floor.

Some years ago a number of these box cars were converted to a pay-as-you-enter type, an end view of

(Concluded from page 528)

about  $\frac{1}{4}$  in. above the proper height. By applying upward pressure with the jack, with the U-strap in place around the I-beam and the rail section being straightened, the surface bend is taken out of the rail in an average time of about five minutes per joint, not including the time required for excavation or back filling. The jack is then slacked off to bring the rail to the exact surface, and the rail is tamped carefully, followed by withdrawal of the equipment. The speed with which surface bends can be removed, especially in connection with a general reconstruction job, is a most useful feature of the equipment which performs work hitherto imposing great difficulties upon the way department.

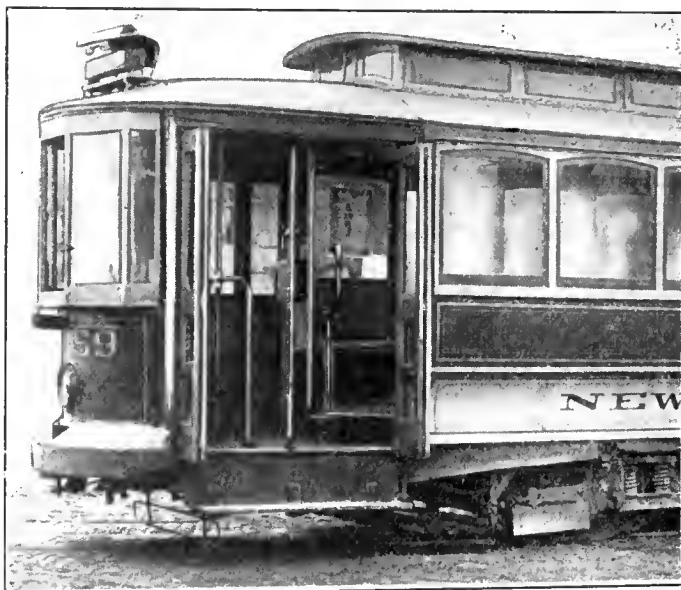


FIG. 3—FIRST CONVERSION INTO PAY-AS-YOU-ENTER TYPE

which is shown in Fig. 3. The method of construction used at that time was to remove the old platform and bonnet and rebuild the platforms, 6 ft. 6 $\frac{1}{2}$  in. over the bumpers, giving a door opening of 57 $\frac{1}{2}$  in. The conductor and the fare box were placed on the platform.

When it was recently proposed to convert the remainder of these cars to the prepayment type, a study of the matter showed that satisfactory door opening and platform arrangement could be made without demolishing the old platform and bonnet. This was accomplished by moving the vestibule corner post forward, cutting off the buffer angle at the step, moving the controller forward close up against the dashboard and substituting a drop-handle ratchet brake staff for the ordinary hand brake staff. All cars are equipped with air brakes and the hand brakes are used only occasionally. The bulkheads were removed and the longitudinal seats cut away at the corner, drop seats being provided in their place for use at the end not occupied by the conductor. The conductor is placed in-



FIG. 1—OLD OPEN PLATFORM CAR

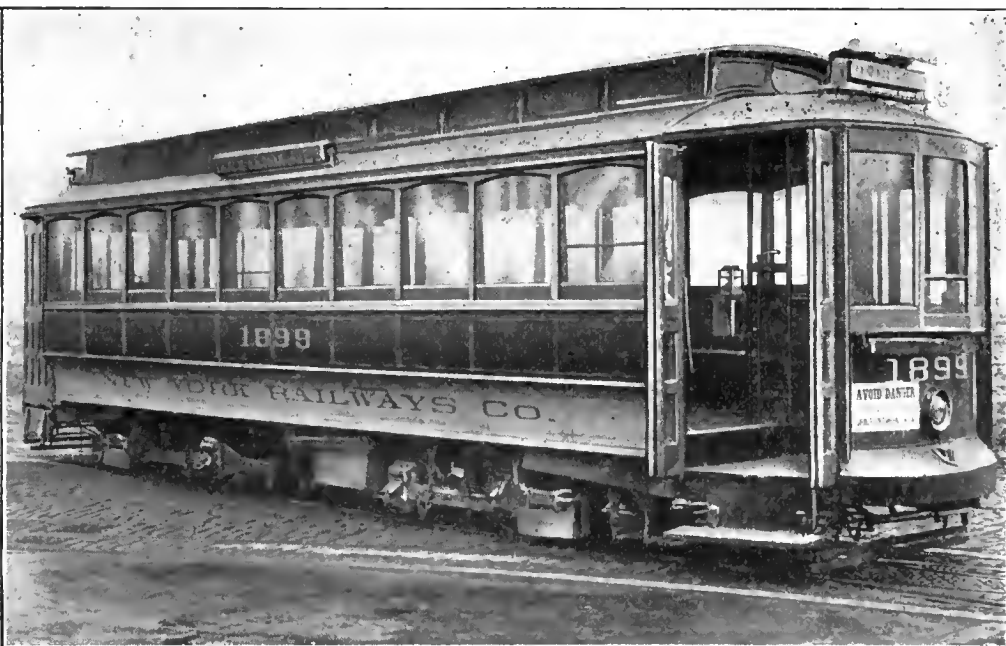


FIG. 2—NEW YORK RAILWAYS CAR REBUILT FOR PREPAYMENT OPERATION



side the car with control stand and fare box. This arrangement gives a 40-in. door opening which has been shown by numerous tests to be entirely satisfactory for handling two streams of passengers, one entering and one leaving. It is also possible to pick up on this platform, lined up before the fare box, as many people as could be handled on the older long-platform cars which were considerably obstructed by the conductor,

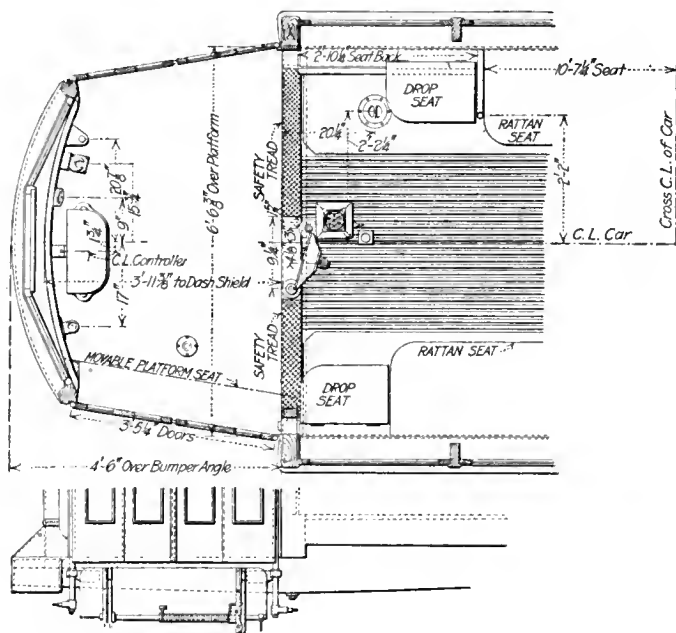


FIG. 4—DETAILS OF NEW YORK RAILWAYS CAR CONVERTED FOR PREPAYMENT

fare boxes and prepayment railings. A plan of the new car is shown in Fig. 4 and a photograph in Fig. 2.

Manually operated, double folding doors and folding steps furnished by the National Pneumatic Company are being installed, all operating levers of which are located beneath the platform. The motorman operates the front door by means of a handle at the left of his controller and the conductor operates the rear or entrance doors by means of a handle very similar to a controller handle located beside the stanchion upon which his fare box hangs. The fare boxes are of the Johnson type and Sterling fare registers already on the cars are retained and are operated either by hand strap or by pedal mechanism. Rico coasting recorders are installed on all cars.

In rebuilding the cars the cutting off of the longitudinal seats and the substitution of drop seats provides a seating capacity of thirty-four in place of the original thirty-six. All seats are now being recovered in rattan, replacing the original carpet covering. With the folding step arrangement the successive heights from ground to car floor are now 13 3/8 in. to the step, 13 in. to the platform floor and 8 1/4 in. to the car floor. The same motor and control equipment is retained, with the addition of the folding-door interlock arrangement. The lighting system is also unchanged. It consists of three five-light series clusters and one light at each end. The weight of the car has been increased to 29,686 lb. by the changes.

The cost of the work has proved to be \$600 per car less than for the conversion first made in the original car by extending and entirely rebuilding the platforms and bonnets.

## Shop Rearrangement in Rochester

Shifting of Tools and Installation of Materials—Handling Equipment Has Greatly Increased Capacity of General Repair Shop

THE St. Paul Street shops of the New York State Railways at Rochester are limited as to floor area, so that, with the increase in demand upon their facilities, it has become necessary to make the most of the available space. The general arrangement of the shop layout was explained in the issue of the STREET RAILWAY JOURNAL for April 11, 1903, page 548. A supplementary article appeared in the issue for Jan. 16, 1904, page 100. Recently a number of changes have been made for the purpose of increasing the amount of work which can be turned out with a limited shop force, largely by placing the tools where they can be served more readily while keeping the operators out of each other's way, and by introducing devices for handling heavy pieces. This rearrangement has been a factor in the large car remodeling job now going through the shops.

The principal changes in the shops have been in

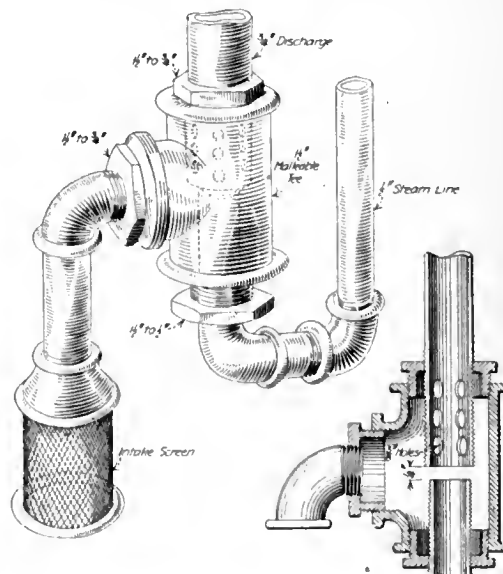
## Inexpensive Water Ejector for Pit Use

By J. E. HESTER

Union Traction Company of Indiana, Anderson, Ind.

SOME years ago the writer took charge of a shop where the working pits became flooded with water whenever any considerable amount of rain fell. This had to be removed by hand-dipping, a very slow and expensive method.

There were no funds available with which to purchase a pump or other suitable device to remove the



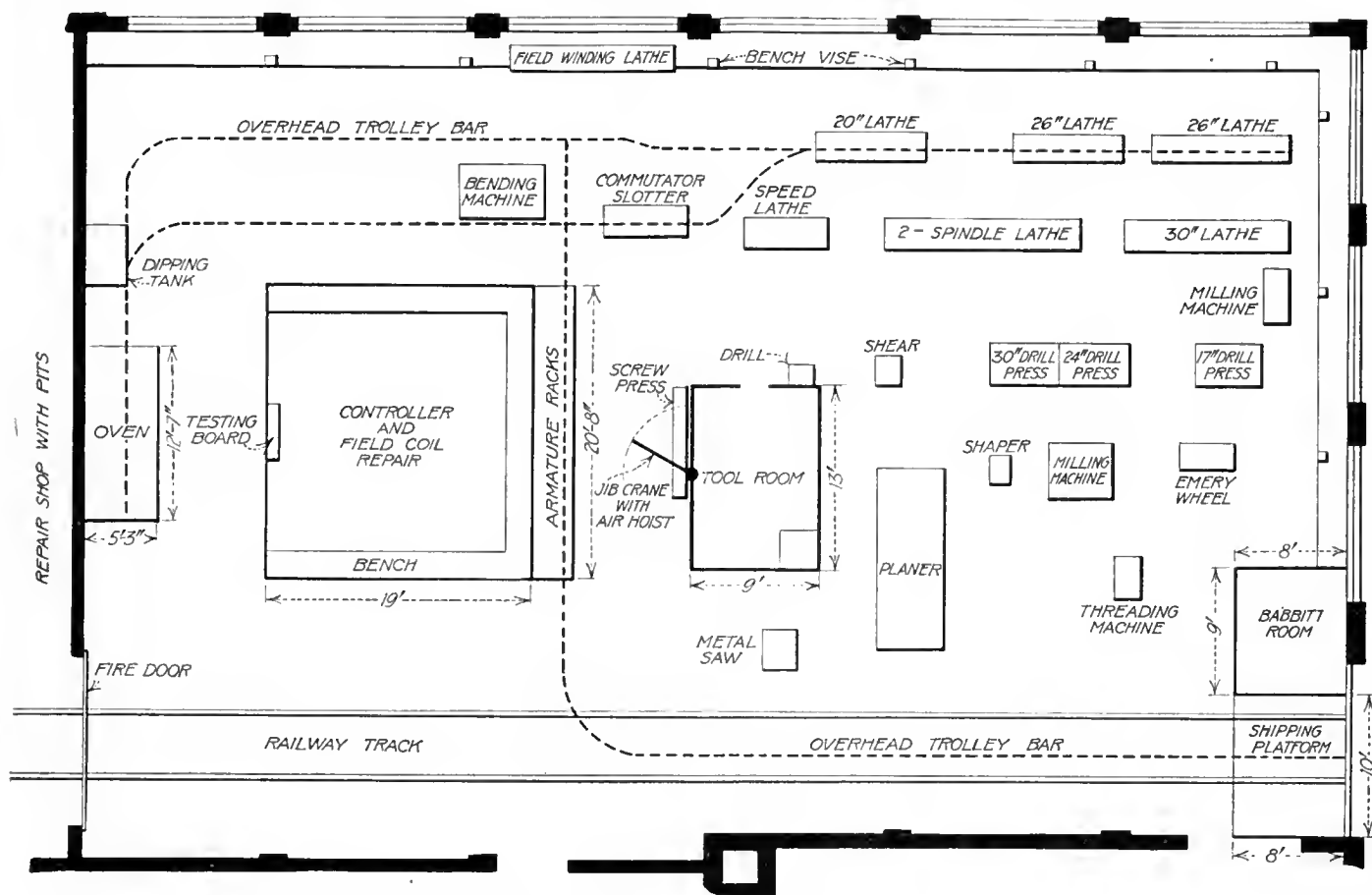
WATER EJECTOR CONSTRUCTED FROM ORDINARY PIPE AND FITTINGS

water, so the writer secured some pipe and fittings from the stockroom and constructed the ejector shown in the accompanying figure. The drawing is self-explanatory. The ejector can be made in a few minutes and has proved most effective in overcoming the trouble. Fittings of any size can be used, but naturally the larger the fittings the more rapid will be the displacement of water.

the large room which accommodates a number of machine tools, the armature winding section and the controller repair department. The plan of this room is shown in the accompanying drawing. Near the center is the toolroom, within easy reach of all parts of the shop. One corner is taken up with the lathes, arranged in rows with excellent natural lighting from windows in two walls in addition to the skylight. Near them is a battery of drill presses compactly arranged. A planer, a metal-cutting saw, a grinder, a screw press, etc., are all placed to good advantage. A General Electric commutator slotter is the latest addition to the machine equipment in this shop.

The sections of the room assigned to the armature winding and controller repair work have not been ma-

vision for heating glue has been made by the simple expedient of putting a sheet metal cover, with holes for the pots, over an ordinary kitchen sink. The water in the sink is kept hot by steam from a pipe, the end of which projects below the surface. A steam drying table, for giving pieces of trim a final heating before use, has also been put into this shop. It consists simply of a long, flat radiator made up of ordinary pipe and fittings. J. F. Uffert, master mechanic of the company, who is responsible for the changes mentioned, has also refitted the office section of the building, which is a two-story division at the St. Paul Street end of the building. The second floor has been divided into two small offices, the outer one for the clerks and the inner one for the master mechanic. These are simply but



LAYOUT OF GENERAL REPAIR SHOP NEW YORK STATE RAILWAYS, ROCHESTER, N. Y.

terially changed. The former work is done in a bright corner, and for the latter a rectangular space is railed off, as shown. A trolley bar has been installed to serve all important machines and storage spaces. This is a home-made outfit consisting of a 1 in. x 3 in. flat steel bar suspended by means of hangers of the same, the hangers being given an offset at the bottom to clear the trolley wheels. The location of the trolley bar is indicated by a dash line on the drawing. Chain hoists are hung from the bar on simple trolleys.

From the number and size of machines in this shop one would think that it would appear crowded when in full swing. This is not the case, however, and there is no confusion even when the full number of men are at work.

In the pit shop the main improvement has been the putting into commission of a number of previously purchased air hoists carried on trolley bars. In the wood shop the changes have been of minor character. Pro-

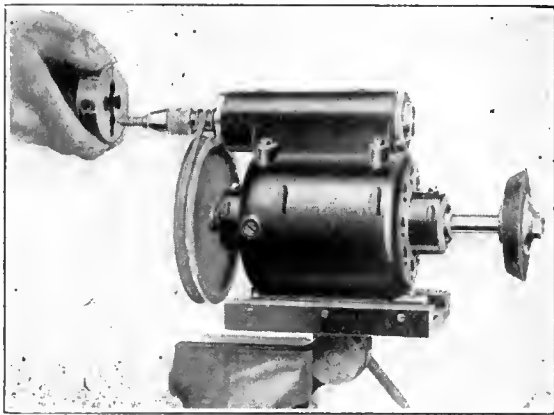
attractively finished and furnished. On the first floor are offices for the assistant master mechanic and time-keepers.

Like master mechanics generally, Mr. Uffert is enthusiastic regarding the possibilities of saving money by the use of gas and electric welding. Last spring he had on hand an accumulation of 532 broken motor cases. Of these all but fifty have already been reclaimed, the welders working on jobs of this kind when routine work is light. The local railway has been purchasing new motors of late in connection with large orders of front-entrance center-exit cars. These motors are the source of so few repairs that Mr. Uffert has been able to utilize the armature and field winding force for bringing the older equipment up to date, especially in respect to insulation, thus greatly reducing the number of pull-ins. At the same time the bearings are being rebored where necessary and the motors fixed up generally as a part of a large rehabilitation program.

## Portable Electric Grinder with Speeds Up to 30,000 R. P. M.

A PORTABLE electric grinder with interchangeable equipment which permits the handling of a wide range of work is known as the "Dumore" and is adapted for work on dies, reamers, gages, deep internal grinding and "hard to get at" jobs.

It is claimed that the secret of the tool's success lies in the high cutting speed of 10,000 to 30,000 r.p.m. obtained on the various ball-bearing mounted spindles. Another important feature is that each armature is



HIGH-SPEED PORTABLE ELECTRIC GRINDER

dynamically balanced and there is said to be no possibility of chatter marks in the work.

The grinder is equipped with a "Universal" motor which operates on either direct or alternating current and develops  $\frac{1}{4}$  hp. The outfit complete includes a number of attachments, full equipment of wheels, cutter rest, etc., and the weight is only 17 lb. This grinder is manufactured by the Wisconsin Electric Company, Racine, Wis.

## New Types of Joint Plates for Welded Joints

THE Atlantic Welding Company, New York, has completed arrangements with The Rail Joint Company whereby the latter company will roll a special type of joint plate for the Gailor welded rail joints exploited by the welding company.

The plates possess a cross section, as shown in Fig. 1. The design permits the Atlantic process welding under the head of the rail and brings the weld to the base in



Fig. 1

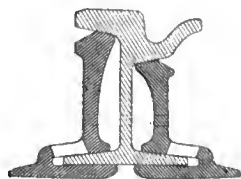


Fig. 2

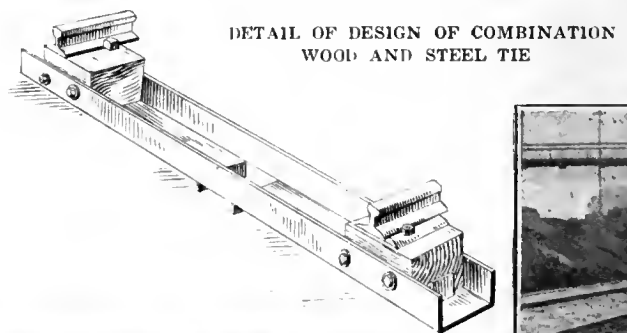
the most desirable place for all sections. These plates are adaptable to all types of girder, T and tram sections. Due to this arrangement plates for welding can be obtained at figures almost as favorable as ordinary mechanical plates.

A special type of a Continuous joint has been also developed adaptable to the welding company's methods. The plates of this joint are the plates of the usual mechanical Continuous joint, specially prepared with a

bevel to allow welding the top of the plates to the underside head and groove, and have apertures in the base members of the plates for welding them to the top of the base. (See cross section, Fig. 2). This type of joint permits a short length plate to be used, making the cost very attractive. The first trial installation of these joints (see ELECTRIC RAILWAY JOURNAL, Sept. 1, 1917, p. 362), which have now been in service a year are reported to have given perfect satisfaction to date.

## New Steel Tie Retains Advantages of Wood

THE Dallas Railways Company has recently placed an order for a carload of a combination steel and wood tie which has been tried out satisfactorily by several railways in the last two years. This tie is made of a rolled channel section, placed in the ballast trough-side up, with wood bearing blocks to support the rails. The creosoted blocks, which are 18-in. long and about the same width and thickness as an ordinary tie, are firmly bolted into the channel and stand up nearly 2 in. above the side walls. The good features of a treated



COMBINATION WOOD AND STEEL TIE IN SERVICE

wood tie are thus retained and the objectionable features of solid steel or concrete are obviated.

The rail is fastened to the block with any of the ordinary appliances, and, as there is no metal connection between the rail and the channel, perfect insulation is afforded. The blocks reinforce the tie under the rail, where the heaviest stresses have to be met, and thus give substantially the same strength as though the blocks extended the entire length of the channel. By overcoming the rigidity of steel on steel, a more resilient and quieter roadbed is secured. Holes punched in the bottom of the tie provide drainage and afford anchorage in the ballast.

The life of the tie is said to be limited only by the effect of corrosion, as there is no wear of the rail on the channel, and the wood blocks may be readily renewed. The designers of this combination tie, the Standard Steel Tie Company of Dallas, Tex., claim that the renewal of these blocks is offset by the value of the tie as scrap.

### New Steam-Ejector Condenser Air Pump

A NEW FORM of condenser air pump operating on the steam ejector principle has been put on the market by the C. H. Wheeler Manufacturing Company, under the name "Radojet" air pump. While steam ejectors for removing air were used as early

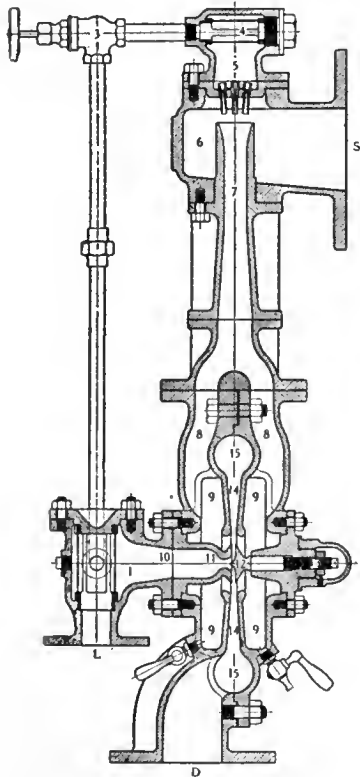


FIG. 1—CROSS-SECTION OF STEAM-EJECTOR CONDENSER AIR PUMP

The mixture passes into the diffuser 7 from which it is discharged, at an absolute pressure higher than that of the air entering at S, into a double passage 8 communicating with the suction chambers 9 of the

as 1868 it is believed that this is the first time that the device has been used to produce a high vacuum commercially.

The principle of operation is shown in the cross-section, Fig. 1. The air entrance from the condenser is at S and the ejector outlet is at D. The steam enters at L, dividing into two paths. One path is through the strainer 1, the vertical pipe, the steam valve 3, strainer 4, expansion nozzles 5 and across suction chamber 6 of the first ejector stage. The steam expands in the nozzles, leaving with a very high velocity, and while passing across suction chamber 6 entrains the air and vapors to be compressed.

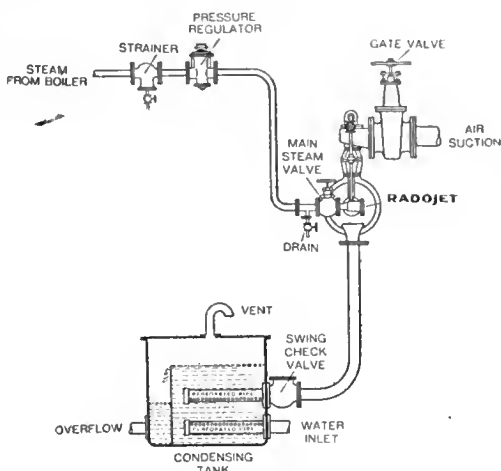


FIG. 2—DIAGRAM SHOWING APPLICATION OF STEAM-EJECTOR CONDENSER AIR PUMP

second stage. These two suction chambers are annular, giving the commingled fluid a large entrainment surface.

The second path of the steam is through strainer 1 into passage 10, which communicates with the annular expansion nozzle formed between two circular disks, 11 and 12. The distance between these disks is adjustable by means of the set screw 13. Thence the steam

is delivered radially in the form of a sheet and, in passing across the suction chambers 9, entrains the air and steam coming from the first stage and carries them into the annular diffuser 14. The compressed mixture is discharged into casings 15 and to the exit D.

From the ejector the mixture of air and vapors can be delivered into a small tank supplied with fresh water for boiler feed as illustrated in Fig. 2.

The makers of the ejector air pump summarize as follows the advantages which accrue from the use of the steam ejector principles: (1) Low steam consumption. (2) Extreme simplicity. (3) No moving parts. (4) No lubrication. (5) Minimum space. (6) Minimum waste. (7) No foundation. (8) Noiseless operation. (9) No attention required during operation. (10) Quick starting. (11) Continuous service. (12) Safety in operation.

The weight of one of these pumps suitable for a 7500-kw. surface condenser is stated to be 450 lb. In a test of a surface condenser equipped with this pump, the following data were noted:

Cooling surface in condenser, sq. ft.	21,000
Load on turbine, kilowatts	11,200
Barometer reading in inches	30.01
Vacuum at turbine exhaust (mercury column)	28.15
Vacuum at air pump suction (mercury column)	28.25
Temperature of turbine exhaust, deg. Fahr.	98
Temperature of circulating water inlet, deg. Fahr.	75
Temperature of circulating water discharge, deg. Fahr.	90
Temperature of hot well, deg. Fahr.	94

About 1,000,000 kw. capacity of "Radojet" pumps has been contracted for, a large portion of which is in successful operation in the United States Navy and on United States Shipping Board vessels.

### Checking Devices and Conservation

IN STUDYING the subject of devices for economical operation of electric railway cars L. E. Gould, president Economy Electric Devices Company, has listed a number of ways in which such devices assist in the saving of energy and materials. The most important of these are summarized below.

In the first place the motorman can save energy: (1) By not accelerating too slowly. Fifty per cent of the energy drawn from the line during the notching-up process is wasted in heat in the resistance grids. (2) By not accelerating too rapidly; that is, to the point of spinning the wheels. This wastes power, injures equipment and is uncomfortable for the passengers. (3) By not coasting up grade between stops. This calls for reacceleration and consequent losses. (4) By avoiding unnecessary slowdowns. (5) By not using the brakes and power simultaneously. (6) By not "fanning" the brakes.

Mr. Gould divides the possible savings in car operation into three groups, as follows:

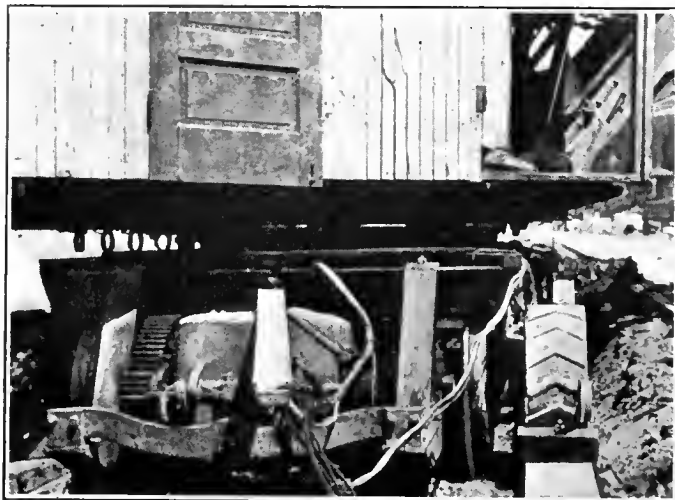
**Power Savings.**—Direct saving from improved handling of controller and brakes. Lower peaks. More efficient schedule speeds. Distribution system relieved of part of its load. Wider recognition of power waste.

**Equipment Savings.**—Constant inspection of condition of motors and brakes. Data show most efficient equipment for given service. Less wheel wear from spinning. Less brakeshoe wear. Less roasting of motor coils. Quick detection of short-circuited fields.

**Accident Savings.**—Crews are more watchful. Power is on for a shorter time. Maximum speeds are lower. More uniform braking is secured.

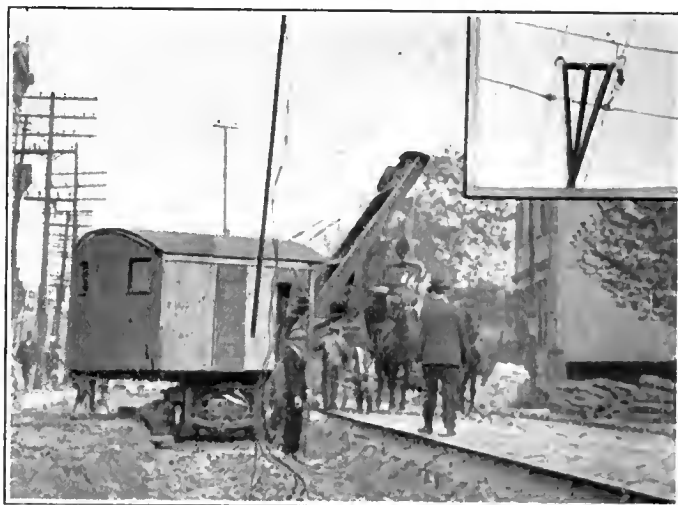
## Electric Shovels Prove Their Value in Cincinnati

THE Cincinnati (Ohio) Traction Company has had in operation for some time two Thew shovels, electrically equipped, which have given excellent service. They are used primarily for excavating track trenches, but are found equally satisfactory for breaking out concrete. For unloading sheet steel from railway cars the dipper is removed and a lifting magnet is substituted. At other times a small clam-shell bucket is



TRUCK WITH BULL WHEELS OPERATING ON PLANK TRACK

used to remove excavated material which has previously been placed alongside the track by the dipper when operating conditions were such as to prevent completing the operation in one movement. Another instance which shows the adaptability of this machine is when it is used with the clam shell to keep the stone side of a Foote continuous concrete mixer full and thus accomplish the work of eight laborers.



ELECTRIC SHOVEL IN OPERATION, CINCINNATI TRACTION COMPANY—INSET, CONTACT DEVICE

When operating on track the shovel is propelled on standard car wheels, but is mounted on bull wheels for traveling in the trenches. The truck axles are long enough for the bull wheels to be pressed into place outside the car wheels. The bull wheels are of smaller diameter than the car wheels, and when used are operated over a plank track made in short sections. The shovel is operated as a trailer when moving it to

a new location on the system. The bull wheels are then keyed into position, and it is run into a short trench previously excavated.

Power is taken from the trolley by a flexible connector, which also completes the circuit as the company uses an overhead ground. The electric equipment consists of GE-800 motors for traction and 20-hp. Westinghouse motors for operating the bucket. Between 250 and 400 ft. of single-track trench can be made in ten hours, depending upon the class of materials, length of haul and street congestion.

## Remote Control of Heavy Electric Current Switches

THE Texas Power & Light Company has recently purchased from the Union Switch & Signal Company interlocking material for operating from a central point a large number of oil switches located out of doors on pole construction. They are to be installed at the Payne switching station, Dallas, Tex. The ultimate switching system will comprise one one-lever, three two-lever, twenty-five three-lever and eleven four-lever Union dwarf machines, each completely equipped, making a total of 126 levers. For the present there will be one one-lever, three two-lever, eleven three-lever and six four-lever frames, with forty-four working levers. The levers will be arranged in three parallel banks, the mechanical leadout leaving the building in two directions. About one-third of the levers in each bank, located near the center, will be so interlocked that but one lever of certain groups can be reversed at a time. This is to prevent the closing of conflicting switches inadvertently. The above is a novel means of distant control of heavy current switches which heretofore have been solenoid or motor operated, involving considerably greater expense.

## Street Car Seats in 1868

WASHINGTON had its street car troubles fifty years ago, as now, though not so serious. There was room for everybody on the car, but, according to the following in the *Star* of Jan. 7, 1868, the room was not always equitably apportioned.

"It is suggested that our street railway companies could save their conductors as well as passengers a good deal of needless annoyance by dividing the benches in their cars into single seats. Each person would then know just how much room he is entitled to and no two or three would be able, as they often do now, to compel others to stand by occupying more room than they need. A change of this sort would greatly promote the convenience of passengers in general and relieve conductors of a duty which is often as difficult as it is unpleasant." —*Washington Star*.

## Towline Helps to Keep Tracks Clear

C. H. Clark, engineer maintenance of way of the Cleveland (Ohio) Railway, makes a practice of carrying a towline in his automobile as he travels around the city performing his duties. Recently he found a tie-up caused by an automobile stalling on the railway track, and with the aid of the towline soon had the tracks clear. At least six times during the past winter he has ended traffic tie-ups in this manner.



# News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS



## Further Conferences in St. Louis

**Present Emergency May Necessitate Important Changes in United Railways Franchise Terms**

A proposal to repeal the mill tax and franchise taxes aggregating \$480,000 a year, which are now imposed on the United Railways, St. Louis, Mo., was made by a committee of the Chamber of Commerce at a conference on the proposed franchise settlement in Mayor Kiel's office on March 5, attended also by street railway representatives. The Chamber of Commerce Committee proposed that the pending settlement bill be amended by striking out the proviso that the company pay 3 per cent of its gross earnings to the city, and that instead of paying the accrued mill tax of \$2,300,000 in five annual installments with interest at 6 per cent, the company be permitted to pay the mill tax debt in ten annual installments without interest.

As a result of the meeting on March 5 the Mayor instructed President Kinsey of the Board of Public Service to invite representatives of the United Railways, a committee of the Chamber of Commerce and members of "such organizations as he sees fit" to confer on the proposed changes. No date has been set for this conference.

### PROPOSED AMENDMENTS

Amendments, to which Mayor Kiel and other city officials have given their assent, would introduce into the pending bill these provisions.

Abolition of the mill tax and the franchise taxes, totaling \$480,000 a year.

Extension of the time period allowed for the payment by the company of the accrued mill taxes, amounting, with interest, to \$2,500,000.

Acceptance of the new franchise ordinance by the company practically at its own convenience.

Recognition of \$60,000,000 as the valuation of the company's properties, which, President McCulloch announced, would be returned for assessment by the State Board of Equalization at that figure.

The bill now awaiting a report from the Board of Public Service, after having been finally amended by the Board of Aldermen, abolishes the mill tax and the franchise taxes, but imposes a tax of 3 per cent on the company's gross earnings and a supertax on its net revenues above 7 per cent on the \$60,000,000 valuation established; requires the payment of the accrued mill tax within five years, with interest at 5 per cent, and allows nine months after the adoption of the ordinance for its acceptance by the company.

Thomas M. Pierce, general counsel for the company, is reported to have said that the company cannot formally accept the ordinance, if passed, and reorganize its finances until at least six months after the termination of the war.

## Philadelphia Hearing March 27

The Public Service Commission of Pennsylvania has fixed March 27 in Philadelphia for the hearing on the proposed lease of the high-speed rapid transit lines by the city to the Philadelphia Rapid Transit Company. The agreement has already been approved by the company and the city.

## Railway Men Donate Ambulance

A fully equipped automobile ambulance was accepted by the United States Army on March 9 as a gift from the Interborough Brotherhood, composed of employees of the Interborough Rapid Transit Company, New York, N. Y.

The presentation ceremony took place in the Twelfth Regiment Armory. Governor Whitman reviewed the regiment.

Theodore P. Shonts, president of the Interborough Rapid Transit Company, introduced John Phelan, president of the employees' association, praising the loyalty of the employees.

Mr. Phelan said the ambulance was given in honor of the 1800 employees of the company who are now serving in the army and navy. It was accepted by Governor Whitman, who paid a splendid tribute to the patriotism expressed by the Interborough men at home in behalf of the Interborough men abroad. Major Guthrie, in charge of the ambulance section of the Metropolitan Division at Yaphank, accepted the ambulance for the government.



AMBULANCE PRESENTED TO THE ARMY BY INTERBOROUGH EMPLOYEES

## Sticks to Electricity for Belt Line

**Expert for Buffalo Thinks Fifteen-Mile Steam Line Could Be Electrified Quickly**

It is practically assured now that the New York Central Railroad belt line around the city of Buffalo, N. Y., will be electrified by the International Railway providing money can be raised to finance the proposed improvement.

John C. Brackenridge, New York, retained by the city as an electric traction expert, has held a series of conferences with International Railway and New York Central Railroad officials and he says the work of electrifying the New York Central belt line, a distance of approximately 15 miles, can be accomplished very quickly and that the cost of the work would not be excessive. All that he says is necessary is the stringing of overhead wires and the bonding of the rails. Mr. Brackenridge suggests that the discarded cars of New York City's rapid transit lines be secured and rebuilt for use in Buffalo.

The proposed electrification was discussed at the meeting before the Public Service Commission at Albany on March 4, to which reference is made on page 537 of this issue. It was said that the plan proposed by Mr. Brackenridge would cost \$1,200,000. General Manager Crowley of the New York Central said such a proposed electrification would be unwise for Buffalo. Relief for the transit situation should be undertaken in some other way. President Connette, of the International Railway, said there were so many details to be considered that he hesitated to express an opinion. He said he would consider the project and inform the commission.

## Municipalization Progress in San Francisco

### Six Different Points of Agreement Reached in the Negotiations for the Purchase of the United Railroads by the City

William von Phul, vice-president and general manager of the United Railroads, San Francisco, Cal., and City Engineer M. M. O'Shaughnessy have been in consultation for several weeks in an effort to work out a plan agreeable to both parties and under which the city could purchase the entire United Railroads' system. The actual values involved have not as yet entered into the discussion. The chief subject of debate has been the method of valuation to be adopted.

A notable step in the progress toward common ground was the agreement that the cost of reproduction is to be based on an inventory of properties and unit prices representing an average of normal conditions for the five-year period, 1913 to 1917, inclusive. A difficult question will be that of the net earnings which the company may expect to receive from the system in case it were retained until the expiration of franchises. The points of agreement that have been established are as follows:

#### SIX POINTS OF AGREEMENT

1. The sale price of the properties of the United Railroads of San Francisco to the city and county of San Francisco shall be the agreed present physical value of the property plus an amount equivalent to the probable net earnings of the railroad properties during their remaining franchise life.

2. The present physical value shall be the cost to reproduce new as of Dec. 31, 1917, with allowance for betterments to date of consummation of sale, less depreciation, based on the actual physical condition at the date of the consummation of sale. The cost to reproduce new shall be based on a physical inventory of the property and unit prices representing the average of normal conditions for the five-year period 1913-1917, inclusive, and cognizance shall be taken of existing conditions at the time the present property was constructed. The general principles recognized by the Interstate Commerce Commission and the State Railroad Commission shall be followed in making the valuation. In the valuation of the physical property, abandoned trackage shall be taken at its value for old material, and allowance made for its removal and the restoration of the streets.

3. The probable net earnings—to be computed by the best agreed methods—of the properties during their remaining franchise life shall be the difference between the probable gross revenue and the probable gross operating expense for the properties for the period from the date of consummation of sale up to and including the year in which franchises, approximating 134 miles, have expired, plus an allowance for the additional net earnings of the remaining several and isolated lines, if operated independently, to the expiration of the several franchises. The net earnings shall be taken as the remainder of the

gross receipts of the property after deducting operating expenses, taxes, depreciation sufficient to maintain the properties in their present condition under like future operating conditions, and interest on the agreed value of the physical property at the same rate which the city shall pay upon its deferred payments for the physical property.

4. Payments on the purchase price of property shall be made semi-annually from the operating receipts. Deferred payments on the physical value of the property shall bear interest at 4½ per cent per annum. Payments on that portion of the net earning value of the property shall bear no interest.

5. Nothing in the above basis of valuation shall be construed to prevent the establishment of a fair price for the purchase and sale of the properties as between a willing seller and a willing buyer.

6. In the event that the representatives of the United Railroads and of the city are unable to reach an agreement, then such matters as are in dispute shall be referred to an arbitrator, who shall be jointly selected by the city engineer and the representative of the United Railroads. Any expense incurred in arbitration shall be borne equally by the United Railroads and the city of San Francisco.

#### OPPOSED TO PIECEMEAL SALE

Jesse W. Lilienthal, president of the United Railroads, in answer to a request from the city engineer's office, has stated that the board of directors of the company has decided that it would be unwilling to sell the properties piecemeal and that therefore an offer for the purchase of the Parkside lines cannot be considered.

#### Columbus Publicity Continued

The refusal of the City Council to grant the Columbus Railway, Power & Light Company, Columbus, Ohio, an immediate increase in the rate of fare is only an incident in the company's campaign for relief from oppressive requirements of its 1901 contract. The action of the Council is only an expression of opinion, and eventually the question will be submitted to a vote of the electors. First, however, the company will put the truth before the people in the publicity campaign that has been started.

The request submitted to the Council involved two questions. One was an immediate increase in the rate of fare from eight tickets for 25 cents to seven tickets for 25 cents. The other was a service-at-cost proposition. An increase in the rate temporarily is needed by the company to maintain proper service, and the company feels that this should have been granted. The service-at-cost plan would have involved quite a period of time for consideration, but

it seems to be uppermost in the minds of the officials. The present franchise has about nine years to run.

In its publicity campaign the company is endeavoring to adhere implicitly to the truth in every statement. It has invited criticism, favorable or unfavorable, in order that it may clearly set before the people every detail of the franchise situation.

Only 1 mile of track has been built in a number of years. That something must be done to enable the company to finance improvements and extensions is obvious. The city is growing and increasing in population and will shortly need increased facilities and additional trackage. It is the desire of the company that some arrangement be made that will enable it to carry out such construction work as is needed.

## Transit Act Upheld

### Court Passes Upon Bauer Act, Under Which Cincinnati Transit Program

#### Will Be Put Through

In a decision handed down on March 5 the Ohio Supreme Court upheld the constitutionality of the Bauer act, under which the city of Cincinnati was authorized to name a rapid transit commission and construct a rapid transit road, and also approved the contract between the city and the Cincinnati Traction Company, except that portion wherein the city guarantees the obligations of the railway. This provision is held to be in violation of Article VIII, Section 6, of the Ohio constitution which forbids the passage of a law authorizing any county or city to become a stockholder in any joint stock company or loan its credit to or in the aid of any such company.

The contract between the city and the company provides for the distribution of the gross proceeds of the rapid transit line which is to be operated by the company, but specifies that certain obligations of the company and securities hereafter to be issued by it shall be paid before the payment to the city of the sums specified in the contract. The court held that this is a loan of the city's credit to the company for these payments.

All other portions of the contract were approved, as were the various steps taken by the Rapid Transit Commission in planning for the construction of the road. The court said the road is needed for the proper transportation of the people to and from the suburbs. The city has a right to enter into a contract with the company for the operation of the road and to provide by contract for the payment of all expenses of operation, depreciation and maintenance out of the gross proceeds received from all sources of operation under such terms and conditions as the city and its duly authorized officers and boards may deem for its best interests. The rental or compensation to be paid to the city must, however, be determined by some method which, while not necessarily a fixed sum, shall not leave the city's fair and just rent or portion of the earnings subject to hypothecation

by the company or applicable to the company's independent obligations.

The opinion prevails that a new contract will have to be made with the company for the operation of the proposed rapid transit road and that it will be necessary to secure the approval of the voters, as was done before. Extreme care will have to be exercised in the formulation of the contract to prevent violation of any of the laws relating to public credit.

Cleveland will benefit by the experience of Cincinnati in this matter, as a rapid transit commission has already been appointed to work out a plan.

## Grave Labor Situation

### Contractors Engaged on New York's New Rapid Transit Lines Fear Financial Ruin

The Public Service Commission for the First District of New York has taken up with the Board of Estimate and Apportionment of New York City the question of whether it may not be necessary as well as advisable to secure legislation which will permit the completion of contracts for construction of some of the lines of the dual system of rapid transit in order to assure the beginning of operation of those lines at an early date. The progress of construction has been interfered with so seriously with embargoes on materials and by the labor situation due to the great amount of government war work going on that remedial legislation is deemed necessary to solve the problem.

A conference has already been held between members of the commission and Acting Mayor Alfred E. Smith, and it is probable that another conference will be held soon between representatives of the commission and the transit committee of the Board of Estimate and Apportionment to determine what legislation, if any, may be had.

The commission in a letter to the Acting Mayor pointed out that the situation was vital and directly affected the city. The letter states that contractors who entered into agreement before the United States declared war are now threatened with financial ruin from the unanticipated conditions which have arisen, while the commission finds itself confronted with the prospect of the abandonment of the work by contractors and consequent inability to get the work completed at a cost within reason.

In order to retain construction forces contractors have found that they must assume burdens which they state they are no longer in a financial position to meet. They are willing to complete their work on an actual cost, no-profit basis, but they do not feel able to advance wages further except on some basis which recognizes the unexpected character of war time exigencies. The commission states that unless this situation is met and legislation obtained which will permit an allowance to contractors sufficient to meet the increased labor cost, cessation of work on some of the new lines seems imminent.

## Protest Against Proposed Buffalo Bills

### International Railway Objects to New Legislation—Chamber of Commerce Has \$30,000,000 Transit Program

Continual unjust criticism of the International Railway, Buffalo, N. Y., by the City Council, daily newspapers and the Municipal Street Railway Commission has so affected the securities of the company that it is even unable to dispose of its bonds at 88, according to a statement made before the Buffalo City Council by Henry W. Killeen, of Penney, Killeen & Nye, of counsel for the railway. Mr. Killeen said that unless the company received the support of the federal reserve bank in marketing bonds to finance approximately \$2,000,000 of improvements planned for this year, the company "will be forced into bankruptcy with three-fourths of the other electric railway properties of the State."

#### LEGISLATION PROTESTED

When it was suggested that the city purchase some of the company's bonds, Mayor George S. Buck replied that the municipality would be willing to lay the new rails and make other improvements to the company's real property and then lease the equipment to the company. Mr. Killeen appeared before the Council to object to the three legislative measures pending before the Mayor and the Council for their approval. All of the measures affect the International Railway.

One provides that the city can own and operate automobile bus lines in competition with the railway; another provides that the city can license jitney lines operated by private companies, and another legislative measure would allow the city to own and operate electric railway properties.

In appearing before the Legislature at Albany to object to the enactment of these measures, Mr. Killeen branded them as unjust and discriminatory and urged the Legislature not to allow them to pass. Referring to traffic conditions in Buffalo, Mr. Killeen declared that the weather during the past winter was the most severe in the city's history; that the company suffered a loss by fire of almost fifty of its best cars; that a large Westside carhouse was burned and that floods crippled more than 100 cars. He said that this combination of circumstances crippled more than 50 per cent of the company's equipment and was wholly responsible for the alleged inadequate service about which the city complains.

#### \$30,000,000 EXPENDITURE RECOMMENDED

The transportation committee of the Buffalo Chamber of Commerce, which has been studying local traffic conditions for almost a year, has submitted a comprehensive report embodying the expenditure of approximately \$30,000,000 to improve the city transportation facilities. This plan of the Chamber of Commerce, includes the construction of a series of electric subway and elevated lines through the congested retail business section. A four-track subway in Main Street from La-

fayette Square to East Ferry Street, a distance of approximately 3 miles, and another four-track subway on the east side between Lafayette Square and William Street and the West Shore Railroad tracks is recommended, together with a double-track elevated line connecting the end of the proposed east side subway with the seawall strip on the extreme south side of the city.

#### CONFERENCE WITH COMMISSION

Nothing is mentioned in the report of the Chamber of Commerce regarding an immediate relief of traffic conditions through rerouting of surface lines, but it is pointed out that there is a real demand for relief from the congested traffic in the retail business district and in the congested industrial centers.

Mayor Buck of Buffalo, General Manager Crowley of the New York Central Railroad; E. G. Connette, president of the International Railway, and the members of the Public Service Commission for the Second District, discussed Buffalo's transportation facilities on March 4. Chairman Hill presided and spoke of the conditions in the northern part of Buffalo, where about 37,000 persons are to be employed in industrial plants whose output is required by the government.

It was shown that surface cars can handle about 14,000 employees while the other employees must be transported by the steam roads. Mayor Buck explained the city's needs to relieve the situation and General Manager Crowley said his company would operate five trains of fourteen or fifteen cars in the morning and at night instead of two as at present. The additional service will require the installation of semaphores, telephones, etc., which will take two weeks to install.

## Electrical Engineers Organize Regiment

A new regiment, composed largely of electrical engineers and known as the Thirty-seventh Engineers, is being recruited for early service in France. Positions still open to volunteers, including men in the draft age, are operators of steam, oil and gas engines and electrically driven pumps, machinists, blacksmiths, sheet metal workers, molders, pattern makers, pipe fitters, oxy-welders and electricians of all kinds, especially wiremen, linemen, armature winders, etc. A special recruiting office has been opened at the State Council of Defense Building, No. 120 West Adams Street, Chicago, Ill., in charge of Major A. B. Kratz, where all applications for this service should be made.

The regiment will be commanded by Col. T. A. Dillon, an officer of the Engineering Corps of the Regular Army, who has been relieved from duty as electrical engineer of the Panama Canal to command this regiment.

## News Notes

**Mayors Favor Municipal Ownership.**—At the State conference of Mayors of New York on March 7, resolutions were adopted unanimously urging the Governor and the Legislature to a speedy enactment of a measure that would permit any municipality in the State to own public utility properties.

**Increase in Wages in Sioux City.**—An increase of 3 cents an hour will be made in the wages of conductors and motormen in the employ of the Sioux City (Iowa) Service Company. The request for shorter working days, the other important feature of the petition submitted by the employees, will be taken up with the men immediately.

**Statement Regarding C. Loomis Allen.**—At Syracuse, N. Y., on March 13 T. C. Cherry, business associate of C. Loomis Allen, former director of the Electric Railway War Board, issued a statement in regard to Mr. Allen as follows: "Mr. and Mrs. C. Loomis Allen are now at a quiet resort, the location of which is withheld at their request. Mr. Allen has not advised his friends of his future plans."

**Utility Magazine Discontinues.**—Owing to conditions growing out of the war the Utilities Bureau, Philadelphia, Pa., has decided to suspend the publication of the *Utilities Magazine*. The Utilities Bureau is the bureau of which Morris L. Cooke is acting director. Arrangements have been made so that if it becomes expedient at any time prior to the regular resumption to issue one or two special numbers of the magazine, it can be done.

**Will Continue Park.**—The lease of Wheeling Park by the West Virginia Traction & Electric Company, Wheeling, W. Va., to Griffiths & Crane has been canceled by mutual consent, but the park will be operated as usual this year. Arrangements are being made with J. A. Moore, Wheeling, to run it. In an item published in the *ELECTRIC RAILWAY JOURNAL* for Feb. 23, page 384, it was inadvertently made to appear that the operation of the park would be discontinued.

**Flood of Municipal Ownership Bills.**—There was a debate in the Senate of the State of New York on March 12 as to where a bill of Senator George F. Thompson, providing for a referendum on the subject of municipal ownership by all towns, villages and cities, should be referred. Senator Brown insisted that the bill should go to the public service committee this time. In the course of his talk he made the suggestion that there were so many municipal ownership bills coming in that it might be necessary to appoint a special committee that could take care of the subject.

**One-Man Car Criticised.**—The *Motorman and Conductor* for February, 1918, contains a signed article by W. D. Mahon, president of the Amalgamated Association of Street & Electric Railway Employees, critical of one-man car operation. Mr. Mahon says that his article is based on a report of the general executive board of the Amalgamated Association. The conclusions are, briefly, that the purpose of the designers and operators in introducing the cars is primarily profit, to save on platform expenses and with no thought for the safety and convenience of the public.

**Plan to Revoke Franchise Put Over.**—The City Council of Portland, Ore., following recommendation of City Attorney La Roche, recently laid on the table the ordinance introduced into the Council by Commissioner Bigelow, asking the revocation of the railway franchises of the Portland Railway, Light & Power Company on the ground that the company is violating the terms of the grant by charging a 6-cent fare. City Attorney La Roche stated that consideration of such an ordinance at this time might interfere with the suit which the city has brought in the courts to annul the 6-cent fare order of the Public Service Commission.

**Frank Putnam States the Company's Case.**—Frank Putnam, counselor of public relations to public utility companies, who is associated with the North American Company, which controls the United Railways, St. Louis, Mo., has written for the *St. Louis Globe-Democrat* a survey of the St. Louis electric railway situation, apropos pending negotiations between the company and its employees as to wages, and the company's plea to the Public Service Commission of Missouri for increase of revenue. During the last six months Mr. Putnam has also written a series of forty-five advertisements for the United Railways. Mr. Putnam was formerly on the editorial staff of the *Post-Dispatch* of St. Louis.

**New Twin City Labor Finding.**—The labor situation in the Twin Cities as it affects the Twin City Rapid Transit Company appears to be clearing up. Final action on the proposed settlement of the Federal Mediation Commission, which has been in session in Minneapolis more than two weeks, is up to the company officials. The basis is practically that recommended by the former commission several weeks ago, namely, that union men may return to the company's employ "as fast as vacancies occur." Present company employees, however, object to the provision that restores strikers to their seniority rights when they are reinstated. The union men on March 10 adopted the commission's recommendations, indorsed the commission and pledged loyalty to the government.

**Bonus for Richmond Employees.**—The Virginia Railway & Power Company, Richmond, Va., recently posted a notice on wages as follows: "Commencing March 1, 1918, and until further notice, the company will pay to all

employees who are in the service of the company at the end of each calendar month in the several operating departments, including the shops, line department, power houses, substations, division offices, motormen and conductors and trackmen, a bonus of 3 cents an hour for men working by the hour, and \$9 a month for men working by the month. This bonus is independent of regular wage scales, and is made to assist our employees in meeting the emergency confronting them during the war period in the high cost of living."

## Programs of Meetings

### Railway Signal Association

A meeting of the Railway Signal Association will be held at the Auditorium Hotel, Chicago, Ill., on March 18. The committee reports to be presented will be on: mechanical interlocking, power interlocking, standard designs, direct current relays, a.c. automatic block signaling, signaling practice, batteries and switchboards, electrical testing, harmonizing of specifications and regional committees. There will also be a memorial service for the late secretary, C. C. Rosenberg.

### United States Chamber of Commerce

Business readjustment to war will be the dominant note of the sixth annual meeting of the United States Chamber of Commerce at the meeting in Chicago on April 10, 11 and 12. The four critical questions of the day—financing the war, railroads, centralized control of industry, and shipping—will be considered from the twofold point of view of filling the government's requirements, but with the minimum disturbance to private industry. More than 500,000 business men will be represented.

### American Railway Engineering Association

The American Railway Engineering Association, through its president, John G. Sullivan, chief engineer of the Canadian Pacific, Western lines, has announced the nineteenth annual meeting to be held in Chicago on March 19, 20 and 21.

The program to be arranged will take cognizance of the changed conditions of the present time in the railway world, more particularly with reference to war emergency yard improvements to relieve the freight congestion; ways and means for overcoming or meeting the shortage of material and labor; devising new ways of labor saving in maintenance work; reclamation and utilization of scrap material; substitution of other materials for wood and steel; conservation of resources; and discovering, if possible, new sources of economy.

The National Railway Appliances Association has similarly seen the special field for its exhibit this year, and preparations have long been under way for a show that will best meet the needs of the railroads under the present circumstances. In all 158 firms have arranged for space.



# Financial and Corporate

## London Income Cut in Half

Another Canadian Company Is Hit by the Rising Cost of Electric Railway Operation

The gross earnings of the London (Ont.) Street Railway for the calendar year 1917 amount to \$417,862 as compared to \$426,314 the preceding year. The last year's earnings, therefore, represented a decrease of \$8,452 or 1.98 per cent.

This was due in a measure to the large number of soldiers entraining in the city in 1916, thereby causing an abnormal increase in that year.

This decrease in earnings was greatly exceeded by the rise in operating expenses. These for the calendar year 1917 amounted to \$331,094 as compared to \$292,401 the preceding year, an increase of \$38,693 or 13.23 per cent. Owing to the redemption of bonds, the deductions from income decreased \$1,012. The net income for the year totaled \$47,477 as compared to \$93,610 in 1916, a decrease of \$46,133 or 49.28 per cent.

The maintenance of equipment expenses in 1917 amounted to \$46,713 as compared to \$32,410 in 1916, an increase of \$14,303. Included in the 1917 maintenance is an item of \$10,267 for the rebuilding of cars, as compared to \$1,978 in 1916. The operating expenses in 1917 showed a large increase in both materials and labor, the total being 79.24 per cent of the gross as compared with 68.6 per cent for 1916.

On March 8, 1915, the company began to redeem its bonds at the rate of \$35,000 a year, the bonds redeemed to date totaling \$105,000. While the company has improved its road and equipment on an average of \$46,514 a year, it has not been able to increase correspondingly its bonds and capital stock. The result is, therefore, that on Dec. 31, 1917, there was invested in road and equipment \$233,848 more than the total outstanding bonds and capital stock. With a surplus of only \$194,542 available, the financial operation is said to have become difficult. The directors deemed it inadvisable to declare a dividend for the six months ended Dec. 31, 1917, on account of the large decrease in net income in 1917 and the other prevailing conditions.

## Steam-Electric Deal Proposed

The Southern Pacific Railroad, the Southern Pacific Company, the Visalia Electric Railroad, the Minkler Southern Railway and the Atchison, Topeka & Santa Fé Railway have asked the California Railroad Commission to approve an agreement whereby the Visalia Electric Railroad proposes to sell its line of railway and property south from the city of Porterville, Tulare County, to the

Minkler company. The purchasing company proposes to pay for the properties an amount equivalent to that actually expended by the Visalia Electric Railroad and reconstruct the line acquired so as to be suitable for steam and electric operation. It further proposes to extend the lines to Ducor to connect with the Southern Pacific lines.

The Minkler Southern Railway is controlled through stock ownership by the Santa Fé company, and through funds advanced by the parent company has been engaged in constructing a railway from Exeter to Porterville. It is now proposed to complete this line to Ducor, where connection will be made with the Southern Pacific lines.

## Bay State Abandonment

Receiver Donham Authorized by the Court to Discontinue 125 Miles of Unprofitable Lines

The Bay State Street Railway, Boston, Mass., may abandon 125 miles of electric railway in sparsely settled districts. Permission to do this was granted to the company on March 11 by the United States Circuit Court. Discontinuance of the lines is not hedged about by alternatives. The order of the court carries with it no restrictions. The entire matter is left to the discretion of the receiver of the railway, Wallace B. Donham, who appealed to the court for the order.

Coincident with this request announcement was made that the communities thus threatened with loss or curtailment of service would be given reasonable notice of the intention of the company. The announcement was unsigned. It was contained, however, in an envelope bearing the return address of the Association of Owners of Massachusetts Street Railway Securities.

### THE STATEMENT

The announcement was as follows:

"The Bay State Street Railway, through Receiver Donham, has just filed a petition with the United States Circuit Court for authority to discontinue operating approximately 125 miles of track. This, with the track already discontinued, and awaiting other proceedings, totals 141 miles.

"The receiver states that these lines in general are in the sparsely settled communities where the travel is insufficient to make them pay.

"Under present conditions, with abnormal operating costs on the whole property, and particularly with the high cost of coal, it is impossible to raise money for proper maintenance of these tracks.

"It is the intention of the receiver to give ample notice to the communities involved before service is discontinued,

as it is realized that in many respects the decrease in values which would follow the giving up of these lines would be a serious problem to the communities affected.

"There are pending at the present time before the Legislature a number of bills, passage of which would authorize local communities to consider the question of whether they prefer to have the lines operated with some local assistance, or desire to have them given up, and it is the hope of the receiver that this legislation in some form will be passed, and before the actual taking out of the service that the wishes of the local communities may be thoroughly considered."

# Financial News Notes

**Mr. Dodge a United Director.**—At the annual meeting of stockholders of the United Gas & Electric Corporation, New York, N. Y., the retiring board was re-elected with the exception of S. J. Dill, who was succeeded by Marshall Dodge.

**Stock Increase Authorized.**—The Ohio Public Utilities Commission has authorized the Cleveland (Ohio) Railway to increase its capital stock \$2,700,000. The sum of \$1,230,000 will be used to pay floating debt and the remainder will be spent for improvements to be made during the present year.

**Southern Illinois Company Purchased.**—The Public Utilities Commission of Illinois has authorized the Central Illinois Public Service Company, Mattoon, Ill., to purchase the entire outstanding capital stock of the Southern Illinois Railway & Power Company, Harrisburg, Ill., which operates 17 miles of line.

**New Directors for Syracuse Suburban Lines.**—C. Loomis Allen, Syracuse, N. Y., on March 12 was succeeded on the board of directors of the Syracuse & Northern Electric Railway, Inc., by W. J. Harvie, on the Rochester & Syracuse Railroad by W. K. Zinsmeister, and on the Auburn & Syracuse Electric Railroad by Frederick W. Barker.

**Bond Issue Contemplated.**—The directors of the Cities Service Company, New York, N. Y., are said to be considering the issue of between \$2,000,000 and \$5,000,000 of convertible 7 per cent debenture bonds, the proceeds to be used in chief part for the extension of operations in the organization's oil fields in Kansas.

**Road Being Dismantled.**—Thomas Flynn, Bluffton, Ind., has begun the dismantling of the property of the Bluffton, Geneva & Celina Traction Company, which he purchased at receiver's sale last November, and as a consequence the operation of the prop-



erty has been discontinued. The affairs of the company were reviewed briefly in the ELECTRIC RAILWAY JOURNAL of March 9, page 475.

**Receiver Appointed for St. Paul Southern.**—The St. Paul (Minn.) Southern Railway has been placed in the hands of a receiver by Judge W. L. Converse of the District Court at Hastings. Application was made by the Northwestern Trust Company, St. Paul. A. R. Walbridge has been named trustee for the bondholders. A deficit of \$51,934 has accumulated since the road was placed in operation late in 1914.

**Reduction in Common Dividend by Twin City.**—The Twin City Rapid Transit Company, Minneapolis, Minn., has declared a quarterly dividend of 1 per cent on the common stock payable on April 1 to holders of record of March 15. The common stock has been on a 6 per cent a year basis since 1910. It is understood that the reduction in the dividend was due largely to the increase in the cost of labor and supplies, the higher prices for coal being a prominent feature in this respect.

**Two-Year Bonds Offered.**—Harris, Forbes & Company, New York; Harris, Forbes & Company, Inc., Boston, Mass., and the Harris Trust & Savings Bank, Chicago, Ill., are offering for subscription \$750,000 of first mortgage 7 per cent gold bonds of the Chicago & West Towns Railway, Chicago, Ill. The bonds are dated March 1, 1918, and are due Sept. 1, 1920. Interest is payable March 1 and Sept. 1 in Chicago. The bonds are in coupon form in the denominations of \$1,000 and \$500. They have been approved by the Illinois Public Utilities Commission.

**Cape Electric Earnings.**—During the year ended June 30, 1917, the Cape Electric Railway, Ltd., Cape Town, South Africa, carried 23,752,016 passengers

and earned £231,105, as compared to 22,477,366 passengers earning £212,791 in the preceding fiscal year. The profit and loss account at the end of the year totaled £79,893. The difficulty of obtaining supplies, the high cost of materials and the increased war bonuses kept the cost of operation at a high level during the year. The expenditures were further increased by the additional taxation imposed by the government.

**Louisville Net Falls Off.**—At the recent annual meeting of the Louisville (Ky.) Railway it was reported that the gross earnings during the calendar year 1917 were \$3,849,805 as compared to \$3,365,376 in 1916, or an increase of \$484,429. Operating expenses and all charges during the year were \$3,214,474, an increase of \$638,011. The net income at \$635,330 showed a decline of \$153,883. During the year the company built several miles of track to Camp Taylor, which are now bringing in good returns. The interurban lines had to meet heavy competition from passenger automobiles and from freight trucks. As a result business for the year was not satisfactory. A switch to handle interurban livestock was built into the Bourbon Stock Yards, but it was constructed too late in the season for any benefit in 1917.

**Common Stock Dividend Policy Announced.**—The stockholders and the directors of the Cities Service Company, New York, N. Y., have approved the following resolution: "Resolved, That until such time as there has been invested in the property of the Cities Service Company, or its subsidiaries, from the earnings of the company, a sum equal to the entire par value of the preferred stock then outstanding, there shall be no dividends paid in cash on the common stock in excess of 6

per cent per annum, unless the company shall, for a period of six months, have purchased and retired all preferred stock that can be purchased in the open market at 110 per cent of par or less."

**Bay State Order Vacated.**—With the consent of all parties concerned Federal Judge Dodge has vacated an order issued on Jan. 2, under which Wallace B. Donham, receiver for the Bay State Street Railway, was authorized to issue receivers' certificates to the amount of \$379,000 to meet interest and tax obligations. This action was taken pending a decision by the Federal District Court on the claim of the State of Massachusetts for a franchise tax. Of the amount originally authorized \$162,000 was for interest on bonds of the Boston & Northern Street Railway, \$136,000 for similar payments to the bondholders of the Old Colony Street Railway, and the remainder to meet the State franchise tax.

**Detroit United Bonds Offered.**—The Guaranty Trust Company, New York, N. Y., is offering for subscription at 97 and interest, yielding about 7½ per cent, \$4,500,000 of Detroit United Railway five-year 7 per cent collateral trust gold notes due April 1, 1923. The notes are to be the direct obligation of the Detroit United Railway specifically secured by pledge with the trustee, the Central Trust Company, New York, N. Y., of \$9,000,000 par value of bonds and dividend-paying stocks. The notes are to be issued to refund \$3,500,000 of notes due on May 1 next; to reimburse the treasury for advances made to refund underlying bonds, and for capital expenditures. The issue of the notes has been passed upon by the capital issues committee of the Federal Reserve Board. The bonds are offered subject to the approval of the Michigan Railroad Commission.

## Electric Railway Monthly Earnings

### BATON ROUGE (LA.) ELECTRIC COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$21,584	*\$10,780	\$10,804	\$3,630	\$7,174
1 " " '16	20,204	*7,084	13,120	3,555	9,565
12 " " '17	231,965	*119,414	112,551	42,736	69,815
12 " " '16	211,694	*100,858	110,836	42,003	68,833

### BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$8,910	*\$10,038	†\$1,128	\$1,318	†\$2,446
1 " " '16	8,788	*9,185	†397	1,121	†1,518
12 " " '17	124,316	*124,778	†462	14,755	†15,217
12 " " '16	122,614	*109,113	13,501	13,286	215

### EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$85,477	*\$44,114	\$41,363	\$12,303	\$29,060
1 " " '16	75,471	*39,710	35,761	9,625	26,136
12 " " '17	938,074	*516,993	421,081	137,120	283,961
12 " " '16	826,313	*444,422	381,891	107,698	274,193

### EL PASO (TEX.) ELECTRIC COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$108,471	*\$71,215	\$37,256	\$6,508	\$30,748
1 " " '16	117,342	*59,202	58,140	5,335	52,805
12 " " '17	1,283,525	*801,771	481,754	67,007	414,747
12 " " '16	1,110,717	*658,564	452,153	59,127	393,026

### JACKSONVILLE (FLA.) TRACTION COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$69,590	*\$44,919	\$24,671	\$15,866	\$8,805
1 " " '16	62,300	*38,149	24,151	15,552	8,599
12 " " '17	698,123	*469,712	228,411	188,896	39,515
12 " " '16	627,193	*423,707	203,486	183,907	19,579

### NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$294,207	*\$141,871	\$146,336	\$28,950	†\$126,969
1 " " '16	182,357	*101,221	81,136	28,597	52,539
12 " " '17	2,582,113	*1,445,663	1,136,450	348,744	†816,455
12 " " '16	1,930,320	*1,157,078	773,242	346,929	426,313

### PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$29,302	*\$21,177	\$8,125	\$7,990	\$135
1 " " '16	28,281	*20,659	7,622	7,268	354
12 " " '17	304,682	*232,079	72,603	90,200	†17,597
12 " " '16	310,962	*213,600	97,362	86,676	10,686

### PENSACOLA (FLA.) ELECTRIC COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$35,081	*\$20,282	\$14,799	\$7,829	\$6,970
1 " " '16	26,843	*14,657	12,186	7,664	4,522
12 " " '17	350,458	*203,680	146,778	93,668	53,110
12 " " '16	280,100	*157,336	122,764	92,675	30,089

### SAVANNAH (GA.) ELECTRIC COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$92,611	*\$58,317	\$34,294	\$24,832	\$9,462
1 " " '16	80,096	*49,649	30,447	23,986	6,461
12 " " '17	968,173	*645,592	322,581	290,549	32,032
12 " " '16	826,093	*553,695	272,398	282,756	†10,358

### TAMPA (FLA.) ELECTRIC COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$87,952	*\$50,019	\$37,933	\$5,085	\$32,848
1 " " '16	91,444	*45,504	45,940	4,368	41,572
12 " " '17	1,001,311	*563,540	437,771	56,118	381,653
12 " " '16	967,086	*527,719	439,367	52,414	386,953

\*Includes taxes. †Deficit. ‡Includes non-operating income.

# Traffic and Transportation

## Flat Five-Cent Fare for Fort Wayne

Indiana Commission Sanctions Withdrawal of Reduced Rate Tickets During Period of War

The Fort Wayne & Northern Indiana Traction Company on March 4 was granted permission by the Public Service Commission of Indiana to charge a straight 5-cent fare and eliminate reduced-rate tickets during the period of the war. This change was noted briefly in the *ELECTRIC RAILWAY JOURNAL* of March 9, page 482.

The city opposed the petition for a straight 5-cent fare, and at a hearing given by the commission in Fort Wayne submitted argument to prove that the company was bound by its franchise contract. The commission found that the company made a franchise agreement under a general law of the State, and that under the recent Supreme Court decision in the Logansport telephone case the Public Service Commission had the power to change the terms of the contract. The Fort Wayne company surrendered its franchise and received an indeterminate permit from the commission last year.

### COMMISSION HAS POWER TO CHANGE CONTRACT

The commission draws a distinction between the general law under which the Fort Wayne franchise contract was made and the specific law under which the Indianapolis Street Railway contract was made. In the former case, it is held, the Legislature did not surrender its power to regulate fares at any time, while in the latter case it did surrender its power for the period of the contract it authorizes.

At the hearing in Fort Wayne, over which Commissioner Edwards presided, eighty citizens filed a petition asking that the commission grant the company temporary relief.

The commission found the physical value of the company's property in the city \$1,800,000, not counting intangibles. It further found that the company had an operating deficit in 1915 of \$13,760; that the company's net earnings in 1916 were less than 1 1/4 per cent of the value of the physical property; and its net earnings in 1917 were about 1 1/3 per cent of the physical value of the property.

### CHANGE EXPECTED TO INCREASE GROSS

The straight 5-cent fare may increase the gross earnings of the company \$75,000 a year, but the commission says that this will depend upon a normal increase in traffic. The commission believes the company will be fortunate if the straight 5-cent fare enables it to realize from 5 to 5 1/2 per cent on the physical value of the property. The in-

crease in fares may reduce traffic somewhat so that the \$75,000 estimated increase in gross earnings will not be realized.

The commission found that high prices of material and labor, owing to the war, had resulted in financial difficulties for the company, and it further found that 3500 automobiles in Fort Wayne have cut off a great deal of patronage the company formerly enjoyed.

## More Than 100 Fare Increases

Big Gain Since Jan. 1, 1917, in Number of Companies Securing Financial Relief

Since about Jan. 1, 1917, electric railways numbering 119 have secured permission from regulatory bodies to increase fares or have increased them where such consent was unnecessary. This total includes two companies which secured higher fares late in 1916, and also one Canadian company. The information has been compiled by the information bureau of the American Electric Railway Association.

According to similar data previously collected by this bureau and published in the *ELECTRIC RAILWAY JOURNAL* of July 7, 1917, sixty-seven electric railways in the United States and the Dominion of Canada had secured increases in fare from the beginning of 1914 up to June 1, 1917. This total included six Canadian companies. The latest data, therefore, show a big increase in favorable fare awards during the last half of 1917 and the early part of 1918.

### CITY AND SUBURBAN INCREASES SEPARATED

The 119 increases in the recent period to date are divided so as to show fifty increases for urban lines and sixty-nine increases for interurban lines. Higher fares for the urban lines were granted in twenty-three states, Pennsylvania leading the list with ten increases. New York came next with nine increases. Vermont, Massachusetts and Washington each reported three increases. There were interurban increases in seventeen states, Pennsylvania ranking first with thirteen, New York second with eleven, and Massachusetts third with ten. Ohio had six increases, Illinois five increases, and California, Connecticut and Indiana each three increases.

The information bureau also reports that at the present time sixty-one cases for higher fares are pending. These cases cover twenty-one states. Most of them are in New York, which has a total of seventeen. There are six cases pending in Illinois and five each in Ohio, Pennsylvania and Indiana.

The earlier data compiled by the information bureau were secured from reports of fare increases made by commissions and through the technical press. The later data, however, were secured by means of a questionnaire sent to member companies of the American Electric Railway Association. This explains the overlapping of the periods covered by the data.

## Fare Rehearing Put Off

Up-State Commission of New York Puts Over Until March 21 Rehearing in Peekskill Cases

The Public Service Commission for the Second District of New York on March 7 postponed for two weeks action in the petition filed by the village of Peekskill for a rehearing of applications of the Peekskill Lighting & Railroad Company and the Putnam & Westchester Company for permission to increase fares.

The hearing resulted in an agreement between R. F. Barrett, corporation counsel, and M. S. Decker, former Public Service Commissioner, representing the companies, to inspect the company's books as to the allocation of certain charges, and if Mr. Barrett discovers anything to notify the commission and the rehearing will be considered. Otherwise the village's application will probably be denied.

The commission declined to take up a request for a rehearing of the 5-cent fare provision in the franchises given the company because the Appellate Division has upheld the commission.

### APPLICATION FOR REHEARING UNSUPPORTED

Mr. Barrett complained against the provision of the commission's order under which transfers were canceled. He said the railroads were now charging a 7-cent fare, with no transfer privilege, but Mr. Decker said four tickets were sold for 25 cents.

Mr. Decker objected to a rehearing, saying no facts had been presented in support of the application that in any way tended to throw doubt on the accuracy or propriety of the decision of the commission in both cases. He said that it had been shown that in the first six months in 1917 expenses exceeded receipts by about \$6,000, and that for the year the companies were \$12,175 behind in operating expenses. He said allocations had been made in accordance with the requirements of the commission. At the commission's suggestion Mr. Decker agreed to permit Mr. Barrett to inspect the books of the corporations.

It was stated that the Putnam & Westchester Traction Company had lost more than 6500 fares because of people walking to their homes or to the other line. It was asserted that the company suffered most under the transfer system.

The reasons for the request for the rehearing were reviewed in the *ELECTRIC RAILWAY JOURNAL* for March 2, page 436.

## Beeler Washington Report Considered

### A Consolidated System and Increased Rate of Fare Suggested by Washington Railway & Electric Company

On March 10 the Public Utilities Commission of the District of Columbia submitted to the Senate a report on the local railway situation in answer to a resolution asking for this information. The commission also transmitted the comments of the companies on the Beeler reports.

The commission says that changes recommended by Mr. Beeler to reduce congestion in the vicinity of Fifteenth Street and New York Avenue have been put into force and have greatly relieved the situation. A second recommendation, to reduce the number of stops approximately one-third and have an average spacing of stops within the closely built sections of the district 8 per mile, and in the suburban districts 6 per mile, has been approved by the commission. The necessary stop signs have been ordered by the railway companies and as soon as they are received and erected the order will be made effective, probably about April 1.

Hearings on the proposed changes for the W. B. & A. cars will be begun on March 18. Reports on suggested rearrangement of stops on the most congested section of the Washington Railway & Electric Company's system and staggered working hours for the government departments, will be made public soon. Later the commission may ask for legislation to help the situation.

#### LABOR TURNOVER LARGE

In its letter to the commission the Capital Traction Company attributed the shortage of its rolling stock during the past winter largely to the unprecedented number of cars damaged through the weather conditions in the month of January, but twenty new cars have been ordered and will be available not later than Oct. 1. The labor turnover has also been large. During January, for instance, the company engaged 164 men or nearly 25 per cent of the total in the service at the beginning of the month and lost by resignation or otherwise 131. During the month an average of eighty men were absent from work on account of sickness. The company expressed its appreciation of the value of the Beeler survey and said that it desired to cooperate with the commission in an effort to overcome existing difficult conditions.

The Washington Railway & Electric Company said that it had experienced no lack of cars, but had suffered from lack of men to maintain and operate them. It attributed the shortage of men to war demands and war prices for labor. Severe weather conditions and shortage of coal also prevented many employees from reporting for work by reason of sickness. The company says that a proper development of public utility facilities to meet the inevitable growth of the city is dependent upon two things: First, upon authorization by Congress of a com-

prehensive and reasonable plan of financing "which is now lacking," and second, upon the consolidation of the two principal electric railway systems operating in the district. To the above should be added a higher rate of fare.

On March 5 the Public Utilities Commission of the District of Columbia, Chairman Brownlow presiding and Commissioner Gardiner present, held a hearing to consider the skip stops suggested in John A. Beeler's report of Feb. 7, abstracted in the *ELECTRIC RAILWAY JOURNAL* for Feb. 16.

Only two men representing the public attended the hearing. A. T. Gage, who spoke for himself and a number of other residents west of Connecticut Avenue in the Chevy Chase district, thought that the distance between stops would be too great inasmuch as many people resided a block back of Connecticut Avenue.

#### GENERAL IMPROVEMENT LIKELY

Chairman Brownlow pointed out that even if some citizens in this outlying section did not save much time, the universal use of a skip-stop system would produce a general improvement in the frequency of service and decrease congestion.

Walter Jackson, business manager of the *ELECTRIC RAILWAY JOURNAL*, testified that stops in European cities were much longer than in America, and that intervals like 800 ft. or more were considered necessary for good street railway service.

#### MR. BEELER ON THE SKIP STOP

In reply to Mr. Gage, John A. Beeler, consulting engineer to the commission, said that the stops had not been fixed arbitrarily, but had been laid out with the view of serving the greatest number of people, as established by his traffic checks. The average of 890 ft. was not as high as it seemed because of a 1500-ft. viaduct and other local conditions, which if eliminated from the calculations would result in adding only 100 ft. to the average walk. The average number of stops for Washington as a whole had been worked out as eight to the mile, the number eliminated being about 33 per cent. He added that both companies had already ordered the same style of "Car Stop" sign. This is a 12-in. diameter disk with yellow background and embossed black lettering.

Dr. H. W. O. Millington, representing three civic associations of the Brookland and adjacent districts, spoke very highly of the effort to establish better service through the medium of skip stops. He suggested some minor modifications which would be more helpful than certain others in serving a greater number of people.

W. F. Ham, vice-president and general manager of the Washington Railway & Electric Company, and G. E. Hamilton, president of the Capital

Traction Company, also favored the Beeler skip-stop report and said they would be glad to consider individual changes.

After Commissioner Brownlow had stated that the matter would be taken under further advisement, the civic and railway representatives had an informal conference with Mr. Beeler for the adjustment of the few stops in dispute.

#### ORDER OF POSSIBLE NATIONAL BEARING

The absence of any serious objection to the skip-stop report is of particular interest, as the way the skip stop will work out in Washington may have considerable influence on the decision of Dr. Garfield to issue a nationwide order on the subject.

## Joint Commission Action Likely

### Request for Fare Increase by Kansas City Railways May Engage Attention of Two Commissions

An innovation in public service handling of electric railway matters when a street railway operates across state lines may be provided with reference to the affairs of the Kansas City Railways. The Public Service Commission of Missouri, considering the matter of fares at Kansas City, suggested that the joint meeting of the Missouri with the Kansas Commission would probably be arranged to hear the argument. The commissions would have to hold separate meetings for their decision, though the obvious advantages of a joint meeting to receive evidence and testimony are thoroughly appreciated.

This announcement of the Missouri commission was the result of the argument of city officials at Kansas City, Mo., against any interference by the Missouri commission with the 5-cent fare and universal transfers provided by the franchise of the Kansas City Railways in Kansas City, Mo. The franchise provides in a general way that 5-cent fares and universal transfers shall prevail on all the city lines of the Kansas City Railways, including the lines in Kansas City, Kan., and in adjacent small towns, which form a metropolitan district.

#### APPLICATION IN KANSAS SOON

Officials of Kansas City, Mo., maintain that the city has the only authority over fares and that if inter-city fares are to be considered, the matter would be one for the Interstate Commerce Commission.

The Kansas City Railways will soon file its application before the Utilities Commission of Kansas for increased compensation for its service. Its petition to the commission in Missouri asks only that its revenues be increased to meet increased expenses. The petition in Kansas must be more definite and the company will therefore state whether it desires more than a 5-cent fare or merely a charge for transfers.

Another meeting of the Missouri commission will be held probably in April, at which time the city will file its brief setting forth its claims to exclusive jurisdiction in the matter of rerouting, fares, etc.

## Brooklyn Company Protests

### Objects to Public Service Commission Order Requiring Time-table Data in Cars

The Brooklyn Rapid Transit Company, through President T. S. Williams, has issued a statement protesting against the provisions of the order of the Public Service Commission of March 5 in which the company was directed to carry certain time-table data in its surface cars. This order was reviewed briefly in the *ELECTRIC RAILWAY JOURNAL* of March 9, page 481. The statement made by the company to the press follows:

"The company will co-operate with the commission in any effective way to procure sufficient and regular car service under existing conditions. The order proposed, however, like any attempt to prescribe in detail precise operations covering seventy-five different lines of surface cars and 541 miles of track, leads to complications, absurdities and impossibilities which would probably, if efforts were made to carry it out in detail, impair service as much as it would help it. All electric railway operation in a big city must be elastic in order to be effective. With fluctuations of travel so great as they are in this community, varying not only from day to day but from hour to hour, and by reason of weather conditions or other influences being subject to constant changes, car service cannot be bound by iron rules.

"This applies equally to all congested territories in Greater New York, and we assume that whatever general rule the commission thinks good for Brooklyn will be equally applied to other parts of the city.

"We have had no chance to point out to the commission some of the clearly objectionable features of its order, and as soon as the commission has considered these we assume it will hesitate to compel the enforcement of the order without material modification."

## Cleveland Fare Threatened

The operating report of the Cleveland (Ohio) Railway shows that the interest fund reached the low point of \$170,260 in January because of a deficit of \$55,776 for the month. This indicates another increase in the rate of fare by April 1 or May 1.

On May 1 it will probably be necessary to make an increase in the wage scale of motormen and conductors and after that it is predicted that the income from the maximum rate of fare allowed in the Talyer grant under which the company operates will not be sufficient for operation at a profit. The maximum fare under the franchise is 4 cents cash and seven tickets for 25 cents.

## Portland Court Case Closed

### Argument Completed in Action Growing Out of Fare Increase in Which Life of Commission Is Threatened

The hearing in the case of the Portland Railway, Light & Power Company, Portland, Ore., versus the city of Portland, before a tribunal of six circuit judges of Multnomah County, in regard to the matter of increased fare in Portland granted by the Oregon Public Service Commission, came to a close on March 4. Decision of the six circuit judges who sat en banc throughout the case will be the next step. No definite date for announcement of this decision has been set. The case will probably be appealed to the Supreme Court, regardless of the decision handed down.

#### THE COMPANY'S SIDE

The case closed with arguments by three attorneys. Franklin T. Griffith, president of the company, spoke during the last session, arguing that the act creating the Public Service Commission vested in that body the power to regulate all rates, whether or not the rates were in existence before or after the commission came into being. Mr. Griffith further contended that the city's charter did not give the city the right to make the railway grant inviolable.

The hearing concluded with an appeal from Attorney General George M. Brown on behalf of the Public Service Commission. Without placing any particular emphasis on the justice or injustice of the increased rate, Attorney Brown defended the act of the commission. He maintained that the commission has the right to fix rates on all public utilities, and asserted that to find the act of the commission invalid would destroy its usefulness.

R. A. Leiter, for the company, contended that the commission had a right to alter the rates, because the franchise ordinance under which the 5-cent fare was established was never included in the commission government charter passed by the people at the special election in 1913. This occasioned surprise, as it had been generally believed that the commission government charter was voted by the people of Portland under either the initiative or referendum rights. Attorney Leiter pointed out that the commission government charter had been framed by a committee of nine men, but that the people had never petitioned for the passage of the charter, as is required under the initiative and referendum rights under the "Oregon System." Attorney Leiter conceded that the city had every right to regulate railways and other public utilities, but "not one jot or tittle of power with reference to the regulation of rates." He said that power was solely and exclusively vested in the Public Service Commission.

Attorney Martin L. Pipes, for the city of Portland, stated that because the referendum act which gave existence to the Public Service Commission was not retroactive in its scope, that body had no authority to readjust rates which

had been fixed before the commission came into existence. He contended that the commission's power lay only in the right to readjust rates which had previously been fixed by the utility itself. This right did not include the fixing of rates which had been established by a municipality. Mr. Pipes endeavored to show that the powers and rights delegated in both the city charter and the act creating the commission were parallel, and pointed out that it would be impossible to have such co-existing authority. He asserted that either the city charter or the Public Service Commission must bow to the other.

Wilson T. Hume, representing the city, asserted that a legislative enactment passed in 1901 definitely fixing fares at 5 cents and no more was on the statute books, and in full force and effect. In answer to the contention of the defense that the sovereign power lay with the lawmaking bodies, Mr. Hume argued that this power lay only with the people themselves.

City Attorney La Roche attacked the constitutionality of the referendum measure creating the commission. He discussed the history of the Malarkey bill creating the commission and pointed out that the people of Oregon, who are supposed to retain the sovereign power, have no method of holding a referendum on any act or order of the commission. He asserted that this was sufficient to invalidate any act or order increasing or regulating fares. He further contended that the franchise contract by which the company was permitted and directed to charge a 5-cent fare was an inviolable contract. His third important point was with reference to the retroactive feature involved in the legal controversy. His argument on this line was similar to that of Attorney Pipes.

## New Jersey Fare Case Postponed

The State Board of Public Utility Commissioners of New Jersey on March 14 granted an adjournment of twelve days in the hearing on the application of the Public Service Railway for permission to charge a 7-cent fare and 2 cents for a transfer, with an additional cent for a transfer on a transfer. The board also directed the company to amend its petition to show that the proposed increase would be an emergency measure and not permanent.

Thomas N. McCarter, president of the company, said that new construction work which would cost \$6,600,000 was necessary to sustain the burdens placed on the corporation by the war and that the only way in which this expense could be met was by increasing fares. The corporation would welcome a rate inquiry and co-operate with it, but its needs were so urgent that Mr. McCarter thought the petition should be granted without waiting for the result of an inquiry.



## St. Louis Fare Case Started

President McCulloch the Principal Witness for the Company—Another Hearing to Be Held on March 20

Hearings were begun on March 5 before the Public Service Commission of Missouri with respect to the application of the United Railways, St. Louis, for permission to increase its fares. Richard McCulloch, president of the company, occupied the stand as a witness for six hours. He reviewed various operations of the company, particularly those relating to finance. Many exhibits were introduced, among them a statement of the value of the properties of the United Railways as of Dec. 31, 1917. This statement, reproduced from unofficial sources, follows:

Estimates of physical property	
July 1, 1911.....	\$35,666,359
Less property sold or scrapped before 1917.....	\$34,412,505
Plus 20 per cent increase in construction costs.....	6,163,983
Plus additions to 1917.....	4,364,473
	\$44,940,962
Plus construction overheads—	
Engineering..... 5 per cent	
Legal expenses... 2 per cent	
Contingencies... 10 per cent	
Interest..... 10 per cent	
Taxes and insurance 3 per cent	
Constructor's profit. 10 per cent	17,976,385
	\$62,917,347
Plus superseded property.....	2,740,000
	\$65,657,347
Plus organization and bond discount.....	6,565,734
	\$72,223,081
Plus working assets, Dec. 31, 1917.....	3,053,280
	\$75,276,371
Securities held in treasury.....	1,155,000
Grand total.....	\$76,431,371

### ZONE SYSTEM FAIREST

Mr. McCulloch was of the opinion that a zone system of fares would be the fairest way of increasing revenues, but that it might be difficult to put such a system into effect successfully in St. Louis because of the delay the plan would be likely to cause in traffic during the rush hours. He thought that the zone system would tend to repopulate the so-called "deserted" districts and prevent unwise spreading of the city's area, but that it would not result in forcing congestion.

Mr. McCulloch estimated the total operating expenses of the company for 1918 at \$11,153,177, an increase of \$2,674,188 over the costs of 1917. He said that the labor costs would be increased this year 35.6 per cent, and the cost for materials more than 15 per cent. An outlay of \$3,074,152 would be required for transportation alone. He estimated the total income of the company for 1918 at \$12,569,035. After paying \$11,153,177 as before related for operating expenses \$1,415,858 would be left for depreciation and fixed charges. After allowing 10 per cent depreciation and a mill tax reserve of 2 per cent a deficit of \$92,426 would result. Adding the \$2,523,230 necessary for fixed charges the company would face a total deficit of \$2,615,656.

Mr. McCulloch said that since 1910,

when dividends were suspended, the company had spent \$13,199,714 in maintenance and \$6,779,784 in replacements, and that \$901,931 represented property retired from use. New construction paid for out of earnings cost \$1,988,907. The sum of \$2,463,000 had been expended in retiring bonds.

### ANOTHER HEARING MARCH 20

Chairman Busby of the commission announced that the commission would proceed with deliberation in the case, paying no attention to insinuations of possible strikes. He fixed March 20 as the day of the next hearing, and Counselor Daues of the city, after consultation with C. E. Smith, the city's railway expert, announced that the city would be ready at that time to cross-examine Mr. McCulloch.

The Board of Public Service has retained James E. Allison of James E. Allison & Company, St. Louis, consulting engineers, to serve as technical advisor of the city in its opposition to the application of the railway before the commission for permission to increase fares.

## Talk on Collecting Fares

General Superintendent of Columbus Company Addresses Men on Matter Affecting Them and the Company

The Columbus Railway, Power & Light Company, Columbus, Ohio, issued under date of Feb. 15, over the signature of Harold W. Clapp, general superintendent, an eight-page booklet entitled "Collecting Fares." In it the company said frankly that it does not receive fares for all rides, used an example to show what large proportions the non-collection of fares might assume, and urged all conductors to "get all the fares." It followed this with the rules for collecting fares with the aid of fare boxes. In its introduction the company said:

### MEN AND MANAGEMENT MUST WORK TOGETHER

"Whatever success this company may enjoy is just as important to conductors and motormen as it is to the management. If that success is dependent upon the amount of revenue received and there is a leak anywhere tending to lessen revenue, it is most certainly of vital importance to conductors and motormen for that leak to be stopped.

"Co-operation between men and management in stopping the leak cannot be had unless we all understand each other thoroughly. In reaching that understanding perfect frankness must prevail in the discussion of problems of mutual interest.

"In talking about the collection of fares we have one unpleasant truth to face, but why turn our backs on a big problem because it is disagreeable in some ways? Why fool ourselves by

any such action? Why not talk it over as man to man? That is the true spirit of co-operation, so let us be frank about it."

## Emergency Fare Bill in New York

Railways to Seek by Legislative Enactment a Six-Cent Fare for Period of War

Theodore P. Shonts, president of the Interborough Rapid Transit Company, Col. T. S. Williams, president of the Brooklyn Rapid Transit Company, and officers of other electric railways, at a hearing before Governor Whitman on March 14, submitted for his approval a proposed bill which will be introduced in the Legislature, fixing a 6-cent fare on the electric railways throughout the State, beginning April 1 and continuing in effect until six months after the war.

The bill would give to the Public Service Commission the power of review of such new fares after they were fixed. Governor Whitman is reported to have told the railway men that the bill as it was presented appeared to oust the Public Service Commissioners from their power to fix fares. He suggested an amendment to the bill permitting the increase in fares with the approval of the Public Service Commissions. The bill declares 6 cents "a just and reasonable rate of fare."

Others at the hearing in addition to Messrs. Shonts and Williams representing the railways included S. W. Huff, president of the Third Avenue Railway; L. S. Storrs, president of the New York & Stamford Railway; James F. Hamilton, vice-president of the New York State Railways; W. O. Wood, president of the New York & Queens County Railway, and Horace E. Andrews, president of the New York State Railways.

## Answer in Binghamton Fare Case

The Binghamton (N. Y.) Railway has filed with the Public Service Commission of the Second District its answer to the complaint of residents of Binghamton and Johnson City against the proposed stopping of sale of ticket books between Binghamton and Endicott and between Johnson City and Endicott.

The operation of the company's new tariff has been suspended until April 30. The company alleges that the rate under the dollar book, used between Binghamton and Endicott, is less than half a cent a mile and that the cost to the company is considerably more than the return on both the dollar book and the 60-cent book, used between Johnson City and Endicott. It is alleged that the ticket-book business is entirely one way and it is necessary to operate extra cars to maintain the service.

The rates in force were established about thirteen years ago when Endicott was "a mere hamlet" to aid its industrial development. At that time the cost of operation was much less than now. The answer cites the service given between the places by the Erie



Railroad and it is claimed these trains carry from 850 to 1000 passengers. The case was referred to in the *ELECTRIC RAILWAY JOURNAL* of March 9, page 482.

## Kansas City Traffic Changes

Engineer of Commission to Assist City in Working Out Operating Details

The Public Service Commission of Missouri at a meeting in Kansas City on Feb. 28 took up many matters of operation of the Kansas City Railways and instructed its engineer, A. L. Harrup, to return to Kansas City to assist in working out new details. With respect to nearly every subject there were objections from city officials that they were matters properly to be handled by the city. In nearly every instance, however, the commission intimated that it could take care of such matters.

The company's request for permission to install a skip-stop system of approximately eight stops to a mile met with favor before the commission. The company was asked to go ahead with its plans for skip-stop operation on one line at a time. Cars will probably stop on all lines at odd numbered streets going out and at those with even numbers coming in.

The company's request as to rerouting cars was not taken up in detail. The commission expressed itself as favorable to shorter loops and turn-backs—an important element of economy in operation being worked out by the company especially on certain long lines on which traffic at the other third is comparatively light.

## "We Walk!" the Cry

A walkers' club has been started at Harrisburg, Pa. Every member pledges himself or herself to walk to and from work, if the distance is less than 2 miles. This pledge is to be kept in all sorts of weather. The movement is another manifestation of the queer turn which the thrift idea has received. The appeal on which the campaign is based is stated as follows:

"In these days when the people generally are being urged to conserve all natural resources, it is our opinion that by walking instead of riding on the electric railway cars we will not only save time for ourselves and others and much of the coal necessary for the production of electricity needed to operate cars, but we will put ourselves in good shape physically—thus obviating the necessity of burning so much coal to keep our houses warm; and we will be effecting a saving in actual money which will not only enable us better to meet the high cost of living, but purchase additional Liberty Bonds and Thrift Stamps, as well as make contributions to worthy causes."

"Running a street railway nowadays is like setting a hen on china eggs—nothing in it."—*The Buzzer* of the British Columbia Electric Railway.

## Commission Ordered Not to Change Fares

Rhode Island Legislature So Directs and Creates Special Legislative Committee to Report by March 26

The Legislature of Rhode Island has prevented the Public Utilities Commission from carrying into effect the new fare rates established as just and equitable for the Rhode Island Company by a special commission created a year ago for that particular purpose. That commission ordered the adoption of a system with 5-cent central areas and recommended taxation and franchise reforms. Its findings were reviewed briefly in the *ELECTRIC RAILWAY JOURNAL* for March 9, page 480.

Two measures have been passed. One of these orders the Public Utilities Commission not to make any change in the rate of fare charged by the Rhode Island Company. The other created a special legislative committee of seven members to make a report before March 26 on the electric railway situation.

### MEASURES ORIGINATE IN HOUSE

Both measures originated in the House the day after the report of the special commission was presented and a day after the Public Utilities Commission had, in accordance with the law passed a year ago, ordered the Rhode Island Company to put into force before April 1 the new rates set forth in the report.

The House provided for a special committee of five, two Senators and three Representatives, to consider the report of the investigating commission, but in the Senate the membership was increased to three Senators and four Representatives, one of each to be a Democrat.

Representative Jennings of Cranston, Republican majority leader of the House, declared in his speeches that the report was "absolutely unjust" and should never be allowed to go into force. He was supported by many of the House members. In the Senate both of the measures were unanimously passed, not one voice being raised in defense of the report.

The trustees of the Rhode Island Company, who are in control of the railway property under the decree of the Federal Court for the dissolution of the New Haven Railroad, have sent to each member of the Legislature the following statement:

### TRUSTEES HAD CONFIDENCE IN REPORT

"The Chairman of the Board of Tax Commissioners, the chairman of the Public Utilities Commission, and the Banking Commissioner, constituting the special commission to investigate the affairs of the company, have now made a report, which has put into effect a system of fares worked out by the commission itself and its advisors as to the adequacy of which to meet the needs of the company the trustees can now form no positive judgment. They have, however, confidence in the commission and in the report of the commission's experts, upon which the action of the

commission is largely based, all of whom believe that, if the relief from excessive taxation which the commission recommends is granted by the Legislature, the new rates of fare will probably enable the company to continue in operation, and the trustees are willing to try the experiment.

### COMPANY CANNOT CONTINUE

"In view of the action now proposed nullifying the results of the investigation by the official commission, the trustees of the Rhode Island Company feel it their duty to say that it is certain that the company cannot continue to operate until the next session of the Legislature of the State, unless action is taken by the Public Utilities Commission or by the Legislature which will result in a substantial increase of revenue.

"Obviously this increased revenue must come, if at all, from the riding public of the cities and towns in which the company operates. If the representatives in the General Assembly of the various cities and towns take the position that, whatever happens, their constituents must not be made to bear any part of the burden, the attempt to obtain increased revenue for the company must fail.

### SYSTEM MAY FALL APART

"What will then happen. It is impossible with certainty to foresee, but it is not improbable that the traction system will fall apart into the separate companies which at the present time lease their properties to the Rhode Island Company."

## Advocates Fare Change

Labor at London, Ont., Favors Fare Increases for London Street Railway

The Trades and Labor Council at London, Ont., on March 6 unanimously adopted a resolution advocating the granting of the appeal of the London (Ont.) Street Railway for higher fares on the ground that the best interests of the men in the employ of the company would thereby be served.

The labor men held the view that the company was not in a position to grant wage increases, as war-time conditions had imposed extreme financial burdens upon it. They therefore advocated favorable action by the Council on the fare application and requested that the Trades and Labor Council be granted representation upon the committee of the Council which it is proposed to name to inquire into the company's financial condition. The railway is bound by a fare agreement made in 1895. This year the company passed its dividend.

The company has for some time carried on an effective publicity campaign under the direction of Glenn Marston, New York.

## Transportation News Notes

**Fare Schedule Protested.**—A complaint has been filed by the city of Coatesville, Pa., against the new schedule of fares filed by the West Chester Railway. It is claimed the increase will be a violation of the franchise.

**Reduced Rate Tickets Withdrawn.**—The Hot Springs (Ark.) Street Railway has discontinued the sale of six tickets for 25 cents and books of twenty-five tickets for \$1, in effect for several years, and is now charging a straight 5-cent cash fare.

**Skip Stop in Oakland.**—Several City Councils have passed skip-stop measures which will permit cars of the San Francisco-Oakland Terminal Railways (Key Route) to cut down stops outside the congested districts. The plan has not yet been put into effect.

**Fare Increase Notices Filed.**—Notices of increases in fares have been filed with the Public Service Commission of Pennsylvania, by the Bangor & Portland Traction Company, Bangor, Pa., and the Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.

**Lend-a-Hand Appeal in Harrisburg.**—Cards asking the traveling public to co-operate with the Harrisburg (Pa.) Railways are being placed in all cars of the company. One of these reads: "Other persons say Harrisburg has better street car service than most cities of its size. Help us to make it still better."

**More Men Secured in Kansas City.**—The increase in the number of trainmen secured by the Kansas City (Mo.) Railways through advertising and other means has made it unnecessary to employ women on the trains. Several women who had been put in training to run cars are now employed in the general offices. They will be put on the cars only if an emergency arises.

**Skip Stops in Indianapolis.**—The Indianapolis Traction & Terminal Company, Indianapolis, Ind., will try out the skip-stop plan on the East Washington and North Illinois Street lines beginning March 17. The company has painted signs on telephone poles indicating where cars will stop under the new plan. On at least one of the lines the stops will be staggered.

**Proposed Portland Tariff Suspended.**—The Public Utilities Commission of Maine has suspended until June 7 the revised rates for the railway lines of the Cumberland County Power & Light Company, Portland, Me., included in the system of the Portland Railroad. The new rates were filed to become effective March 11. This suspension is to allow protestants to examine the company's evidence and perhaps to employ experts.

**New Albany Fare Hearing on March 20.**—The city of New Albany, Ind., has filed with the Public Service Commission of Indiana its answer to the petition of the Louisville & Southern Indiana Traction Company for permission to put into effect a new schedule of passenger rates and to discontinue the service on the Elkin Avenue line. The hearing on the petition will be held in New Albany on March 20.

**Fare Increase Asked in Durham.**—R. L. Lindsey, vice-president and general manager of the Durham (N. C.) Traction Company, has asked the Board of Aldermen of Durham for permission to increase the fare from 5 cents to 6 cents. The request has been referred to a special committee. It has been suggested that if statistical information is desired the books of the company will be open for the inspection of the city officials at any time.

**Seven-Cent Unit On Pennsylvania Roads.**—The Lykens Valley Railway, Williamstown, Pa., has filed a schedule of new rates effective on April 1, with the Public Service Commission of Pennsylvania. The rate per zone is increased from 6 cents to 7 cents. The fare from Lykens to Williamstown will be 14 cents; to Sheridan, 21 cents; to Tower City and Reinerton, 28 cents. Rates for chartered cars and cars making special runs are to be increased about 20 per cent.

**Transfer Changes Suggested.**—H. F. Dicke, general manager of the Utah Light & Traction Company, Salt Lake City, Utah, has presented to the Public Utilities Commission of Utah a proposal for a change in the rules regarding the issuance of transfers. In the proposed new forms the name of the line issuing the transfer would be printed, and the conductor would punch the transfer for the direction indicated by the passenger. The transfers would be good only at the junction of the two lines used.

**Citizen Pleads for Company.**—W. H. Fern, Scranton, Pa., has filed an unusual complaint with the Public Service Commission of Pennsylvania protesting against the complainants who are opposing the increase in fare by the Scranton Railway from 5 cents to 6 cents. Mr. Fern states he is a private individual with no interest in the company, but that he realizes the difficulties a corporation must have to meet because of war conditions. He thinks the increase will not hurt anyone and will be an aid to the company in giving good service.

**Skip Stop for Dallas.**—The skip-stop system is to be tried out by the Dallas (Tex.) Railway. The plan will be put in operation at once on the Ervay line and on several other lines in the downtown district. On the Ervay line the plan will cover the entire route. Careful check will be kept on the time of operation, and definite figures will thus be made available showing just how much time can be saved. If the plan proves successful on this line, which is one of the longest and most generally patronized of any in the city, it will

be extended to other lines. The staggered system will be used.

**Further Discussion of Uniform Operating Rules.**—At a hearing on Feb. 26 before the Connecticut Public Utility Commission, the uniform system of operating rules for all the electric railways in Connecticut was discussed. The matter of uniform rules has been under consideration for some time. An all-day conference was held with the commission at Hartford, on Oct. 25, as noted in the *ELECTRIC RAILWAY JOURNAL* for Nov. 3, page 840, and it was decided at the time that representatives of all the companies receive a copy of the rules and regulations of the commission and report back to the commission in regard to changes proposed by them.

**Increase in Fare on Kansas Line.**—The Public Utilities Commission of Kansas has authorized the Joplin & Pittsburg Railway, Pittsburg, Kan., to raise the fares on its Kansas lines to 2 cents a mile. The company asked an increase to 2½ cents a mile. The commission declined to allow any freight rate increase. It is estimated that the increased passenger rate, when put into effect by the company, will result in a considerable increase in the annual receipts. The increase represents an advance, on an average, of one-fourth to one-half cent a mile. The application of the company for a rate increase in Missouri has not been acted upon by the Public Utilities Commission of that State.

**Passenger-May-Elect Decision Protest.**—The Indiana Union Traction Company, Indianapolis, Ind., has filed with the Public Service Commission a petition for a rehearing in the case in which the commission granted persons traveling between Indianapolis and Carmel permission to pay 24 cents or 30 cents fare at their own option. In its petition the company states that the law provides that only one set fare may be charged between two points and that the commission had not power to permit the charging of two different rates. The decision of the commission in this case was reviewed briefly in the item, "Passenger May Elect," in the *ELECTRIC RAILWAY JOURNAL* of March 9, page 481.

**Donation Bus Bill Vetoed.**—Mayor Hiram C. Gill, Seattle, Wash., has vetoed the so-called free or donation jitney bus ordinance, passed recently by the City Council by a vote of seven to one. Under the terms of the measure the city defined a free or donation bus as "any motor-propelled vehicle engaged in the business of carrying passengers without compensation or charge therefor, provided, however, that any voluntary donation or contribution by any person so carried shall not be construed as compensation for such carriage." The bill carried an emergency, requiring the votes of seven members of the Council and the approval of the Mayor. The disapproval of the Mayor nullifies the bill, placing it in the same position as a bill vetoed by the Mayor and the veto upheld by the Council.

## Personal Mention

**E. T. Smith** has been appointed master mechanic of the Tampa (Fla.) Electric Company to succeed George Hudson.

**F. E. Fletcher** has recently been appointed purchasing agent of the Tampa (Fla.) Electric Company to succeed C. A. Leonard.

**J. C. Freelund** has been elected secretary and treasurer of the Washington (D. C.) Utilities Company, to succeed W. W. Spaid.

**F. J. Gwynn** has recently been appointed assistant treasurer of the Tampa (Fla.) Electric Company to succeed E. J. Seaborn.

**J. W. Gould** has recently been appointed master mechanic of the Wilmington & Philadelphia Traction Company, Wilmington, Del., to succeed W. O. Demoss.

**Emmet McClung** has recently been appointed engineer of overhead construction of the St. Petersburg & Gulf Railway, St. Petersburg, Fla., to succeed C. N. James.

**R. M. Marlowe** has recently been appointed claim agent of the Connecticut Company at Hartford, Conn., to succeed John A. Crilly, who has been made special adjuster for Hartford.

**A. T. Throop** has recently been appointed superintendent of the light and power department of the Wilmington & Philadelphia Traction Company, Wilmington, Del., to succeed C. M. Cooper.

**Norman Grey**, president of the Washington (D. C.) Utilities Company, has been elected president of the Washington-Virginia Railway, Washington, D. C., to succeed Frederick H. Treat, deceased.

**Chester Smith**, for two years assistant to the president at the Kansas City (Mo.) Railways, has resigned. He is now in service in the transportation department of the government in Washington.

**Thomas E. McCarthy**, for the last four years chief clerk to the chief engineer of the Montreal (Que.) Tramways, has been commissioned lieutenant United States Reserves, stationed at Camp Sherman, Chillicothe, Ohio.

**O. J. Richmond**, formerly chief engineer of the power station of the Danbury & Bethel Street Railway, Danbury, Conn., has been appointed superintendent of power for the United Illuminating Company, Bridgeport, Conn.

**C. F. Hayden** has been appointed traffic agent of the Washington-Virginia Railway, Washington, D. C., to succeed C. L. Evans, who resigned from the company to take charge of his souvenir and lunch room business at Mount Vernon, Va.

**Harry Reid**, Louisville, Ky., has been elected president of the Interstate Public Service Company, Indianapolis,

Ind., to succeed Chester P. Wilson. The Interstate Public Service Company is a subsidiary of the Middle West Utilities Company.

**Norman Litchfield** has resigned as engineer of car equipment of the Interborough Rapid Transit Company and New York Railways, New York City, to become mechanical engineer of the American Car & Foundry Company, with headquarters in the same city. In his new position he will be associated with A. E. Ostrander, recently appointed general mechanical engineer of the last-named company. Mr. Litchfield was graduated from the Stevens



NORMAN LITCHFIELD

Institute of Technology in 1901 with the degree of mechanical engineer. He served his apprenticeship in electric railroading in the shops of the Brooklyn Rapid Transit Company. Later he was employed under L. B. Stillwell in the preparation of plans for the equipment of the New York subways and in the supervision of the experimental cars. When operation of the subway began, Mr. Litchfield joined the engineering staff of the Interborough Rapid Transit Company, with which he has since been continuously connected. He has been actively interested in the work of the American Electric Railway Engineering Association, and served as its secretary for a number of years. He was also a member of the executive and the standards committees of the association. He has contributed a number of articles on technical subjects to the ELECTRIC RAILWAY JOURNAL, and is now engaged on a series on the fundamentals of car-body and truck construction, one of which appears elsewhere in this issue.

**S. T. Dow** has been appointed acting general manager of the Atlantic Shore Railway, Sanford, Me., to succeed L. H. McCray, who has resigned to enter government service. Mr. Dow has long been connected with the company as assistant treasurer.

**H. J. Cosgrove** has been appointed master mechanic of the Rock Island Southern Railway, with headquarters at Rock Island, Ill. Mr. Cosgrove was formerly with the Great Northern Railway at St. Paul, Minn. He has served for twenty-five years with the railroads in the West and the South.

**Lloyd Harris**, secretary-treasurer of the Lake Erie & Northern Railway, Galt, Ont., has been appointed chairman of the Canadian War Mission to the United States, with offices in Washington, D. C. Mr. Harris has been associated with the British War Mission in Washington on behalf of the Canadian government for several months.

**Lord Beaverbrook**, a director of the British Columbia Electric Railway, Vancouver, B. C., has been appointed Chancellor of the Duchy of Lancaster, under the British government, and is undertaking general propaganda work relating to the allied nations' position regarding the war. In accordance with the general custom, he will have to resign from the railway.

**H. G. Lawrence** has resigned as superintendent of the railway lines of the Wisconsin-Minnesota Light & Power Company, Eau Claire, Wis., effective on April 1. Mr. Lawrence has acquired an interest in the newly organized Clemons Auto Supply Company, Eau Claire, dealers in automobile supplies and accessories, and will devote his full time to that business, after April 1. Mr. Lawrence went to Eau Claire from Winona twenty-three years ago and started in electric railway work as a motorman. He was successively made conductor, carhouse foreman, assistant superintendent and superintendent, serving in the latter capacity for the last seventeen years.

**L. H. McCray**, for the last eight years general manager of the Atlantic Shore Railway, Sanford, Me., has resigned to accept a position with the Emergency Fleet Corporation, Boston. Mr. McCray's early railway experience was acquired in the Central West. He was assistant to the master of transportation of the Winnebago Traction Company of Wisconsin from 1904 to 1907, which position he resigned to become superintendent of the Sterling, Dixon & Eastern Electric Railway, Dixon, Ill. In 1908 he was appointed assistant general manager of the Atlantic Shore Railway, and was made manager in 1910. Shortly before Mr. McCray's departure from Kennebunk the employees of the Atlantic Shore Railway presented him with a watch and chain, as a token of their esteem.

**R. H. Parsons**, formerly general foreman of electrical repairs of the mechanical department of the Third Avenue Railway, New York, N. Y., has been made general foreman of the Sixty-fifth Street shop, in place of G. R. Jenkins, who has been assigned to other duties. Mr. Parsons was born in Syracuse, N. Y. He received his early training with the New York Central Railroad, advancing to a position of engine house foreman with that company. He

became connected with the electrical department of the New York Central Railroad when that road electrified its New York City terminal and in 1907 entered the employ of the Interborough Rapid Transit Company, from which company he resigned in May, 1908, to become connected with the Third Avenue Railway. In 1909 he was appointed to the position from which he is now advanced. Mr. Parsons has been a frequent contributor to the ELECTRIC RAILWAY JOURNAL.

C. A. Babcock, comptroller of the Rhode Island Company, Providence, R. I., recently completed forty years of service with the company. Associates of Mr. Babcock in the company arranged a dinner in celebration of the event which was attended by the following officers of the company: A. E. Potter, president; R. R. Anderson, superintendent of transportation; A. E. Paddock, general freight agent; Clifford Whipple, general counsel; G. Frederick Frost, attorney; H. B. Shaf-toe, assistant to the comptroller; W. C. Slade, superintendent of power and lines; and H. W. Sanborn, chief engineer. Mr. Babcock entered railway work in Providence on Feb. 28, 1878, as clerk in the office of the Union Railroad. At that time the entire force consisted of 282 employees and officers. At present the force numbers nearly 3400. By the time the company moved its quarters to the Union Trust Building, Mr. Babcock had been promoted until he was treasurer of the company. As other companies were taken over from time to time he was elected treasurer and secretary of each. When the Rhode Island Company was formed in 1902 Mr. Babcock was made assistant treasurer and remained in that position until 1908, when he was placed in charge of the comptroller's office. As comptroller, Mr. Babcock has under his direction the following offices: auditor of disbursements, auditor of passenger receipts, auditor of freight receipts, receiving department, general accounting department, treasurer's office, paymaster's office. Since entering the employ of the company he has served under seven presidents.

## Obituary

John M. Bowers, chosen by President Wilson to act on the Legal Advisory Board in connection with the draft in New York City, died on March 7 in Lakewood, N. J., where he had gone to recuperate from strain due to his war work. Mr. Bowers was in his sixty-ninth year. He had been a member of the New York Bar for nearly fifty years. Mr. Bowers' career was closely bound up with corporation law cases in New York. As counsel for the reorganization committee of the Third Avenue Railway, New York, N. Y., in 1912, Mr. Bowers had much to do with the rehabilitation of the property.

# Construction News

Construction News Notes are classified under each heading alphabetically by States. An asterisk (\*) indicates a project not previously reported.

## Recent Incorporation

\*Chickasaw Utilities Company, Birmingham, Ala.—Incorporated as a subsidiary of the Tennessee Coal, Iron & Railroad Company to construct and operate an electric railway to the new Chickasaw shipbuilding plant. Officers: George G. Crawford, president; H. C. Ryding, vice-president, and L. T. Beecher, secretary and treasurer.

## Franchises

New Albany, Ind.—The Louisville & Southern Indiana Traction Company has asked the Public Service Commission of Indiana for permission to abandon its Ekin Avenue line from Vincennes Street westward to East Fourth and Spring Streets and also certain track in the city of Jeffersonville.

Baltimore, Md.—An ordinance has been passed by the City Council of Baltimore and approved by the Mayor authorizing the Washington, Baltimore & Annapolis Electric Railway to construct additional connecting tracks required for the operation of an extension to its freight terminal facilities in the city.

Kansas City, Mo.—The Kansas City Railways has received a franchise from the City Council of Kansas City for the construction of a double-track extension on Twenty-seventh Street from Prospect Avenue to Main Street.

Tulsa, Okla.—The Oklahoma Union Railway has received a franchise from the City Council to construct a new line in Tulsa. It is proposed to construct a line to Guthrie via Coffeyville.

Fort Worth, Tex.—The Northern Texas Traction Company has asked the City Council for permission to construct new tracks on First Street from Houston Street to Throckmorton Street and to build a curve joining the Throckmorton Street line with the Weatherford Street line in order to relieve the congestion on Houston Street.

Seattle, Wash.—The Puget Sound Traction, Light & Power Company has petitioned the City Council of Seattle for a franchise to operate an electric railway from the intersection of West Spokane Street and Avalon Way, along Avalon Way and Thirty-sixth Avenue Southwest to the intersection of the latter street and West Snoqualmie Street. With the request the company submitted a proposed franchise ordinance, which provides for the completion of

the line within twelve months of the granting of the franchise. The proposed line will materially shorten the distance to the end of the Fauntleroy Park line, and eliminate long delays now occasioned by a single-track section of that line that will be abandoned by operation over the Avalon Way route, and will open up a large residential district within a short distance of the shipbuilding and other industrial plants in the Harbor Island and Riverside districts.

## Track and Roadway

Alabama Interurban Corporation, Birmingham, Ala.—It is reported that the contract for the construction of the proposed line of the Alabama Interurban Corporation from Birmingham to the Warrior River, about 20 miles, has been awarded to A. T. Newell & Brothers. Thomas L. Cannon, Birmingham, president. [Feb. 23, '18.]

Pacific Electric Railway, Los Angeles, Cal.—A survey has been made by the Pacific Electric Railway for an extension from Redlands to Yucaipa City.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—W. R. Alberger, general manager of the San Francisco-Oakland Terminal Railways, recently informed the City Council of Oakland that the board of directors of the company would consider the proposition of a railway line on Adeline Street from First to Sixteenth Streets.

Municipal Railway, San Francisco, Cal.—The Board of Public Works of San Francisco has awarded a contract to Eaton & Smith, San Francisco, for the construction of the "D" line extension of the Municipal Railway on Greenwich Street between Scott and Baker Streets, at \$28,600.

New Orleans Railway & Light Company, New Orleans, La.—An offer to put up money to help defray the expenses of laying tracks and other costs has been made to the New Orleans Railway & Light Company by Paul H. Maloney, representing property holders and residents of that section of the city bounded by Napoleon Avenue, Louisiana Avenue, Rampart and Magnolia Streets. Mr. Mahoney asked that Franklin and Howard Streets be used for the extension. It is proposed that the cars go up one of these streets and down the other.

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md.—In order to protect the heavy traffic between Baltimore and Washington and to Camp Meade, near Admiral, the Washington, Baltimore & Annapolis Electric Railroad has contracted with the Union Switch & Signal Company, Swissvale,



Pa., for the material and installation of automatic block signals on its main line from Scott Street, Baltimore, where private right-of-way is entered, to Naval Academy Junction, where trains branch off for Camp Meade.

**St. Louis & Illinois Railway, St. Louis, Mo.**—The St. Louis & Illinois Railway, through its attorneys, Bishop & Cobbs, has notified Director of Public Utilities Hooke that it will accept the terms of a permit to operate street cars on the free bridge at St. Louis, give a bond of \$25,000 to extend its lines on the East Side and to use the municipal loop in St. Louis when it is completed.

**Southwest Missouri Electric Railway, Webb City, Mo.**—Operation has been begun by the Southwest Missouri Electric Railway on its extension from Galena to Baxter Springs. Work is now under way on the line from Baxter Springs to Picher.

**International Railway, Buffalo, N. Y.**—Within the next few months the International Railway plans to spend approximately \$2,000,000 for repairs and improvements to its surface lines in the city of Buffalo. Of this amount, the largest items include the cost of laying new track in a number of east side streets and for repaving the streets between the rails. The company is also trying to secure some new equipment.

**New York & Queens County Railway, New York, N. Y.**—Application has been made by the New York & Queens County Railway to Borough President Connolly for permission to operate a single-track extension over a loop beginning at Kingsland Avenue, Corona, and extending through Alburts Avenue to the terminal of the elevated route, thence along Roosevelt Avenue to Grand Avenue and through Grand Avenue back to Kingsland Avenue, where the cars of the Corona trolley line are now operated. Should this arrangement be granted, it is the intention of the company to operate College Point, Flushing and Jamaica cars to the Corona elevated terminal instead of taking them to the Fifty-ninth Street side of the Queensboro Bridge, as is now the case with the Flushing and College Point cars. The Jamaica cars now stop at Flushing Bridge.

**Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.**—Plans are being considered by the Mahoning & Shenango Railway & Light Company for the reconstruction of its line between Sharon and the Wheatland Borough limits, at a cost of about \$150,000.

**\*Collinsville, Okla.**—It is reported that D. H. Siggins, Coffeyville, Kan., is interested in the construction of an electric railway from Collinsville to Nowata, Coffeyville and other points.

**Oklahoma Union Railway, Tulsa, Okla.**—A report from the Oklahoma Union Railway states that it plans to construct 2 miles of double track.

**Bridgeburg, Ont.**—The decision of the Ontario government on March 5 to vote \$3,000,000 for Niagara system exten-

sions is believed to indicate that the trolley line from Welland to Port Colborne to Bridgeburg will be started in a few months. This line was contracted for by the Ontario Hydro-Radial Commission, through Sir Adam Beck, two years ago when he made agreements with the municipalities en route to construct the line as soon as the necessary funds could be obtained, the Ontario government to undertake the expense and the municipalities benefiting thereby to bond themselves for the share of each involved.

**Johnstown (Pa.) Traction Company.**—Operation of street cars over the new Walnut Street bridge will be begun about April 1. The concrete work on the big structure is being finished rapidly and the Johnstown Traction Company will begin track work in a week or two.

**Reading Transit & Light Company, Reading, Pa.**—Preparations are being made by the Reading Transit & Light Company for the reconstruction of its tracks on Lehman Street, Lebanon.

**Three Rivers (Que.) Traction Company.**—This company contemplates a 2-mile extension of its line toward the western limits of the city.

**San Angelo Water, Light & Power Company, San Angelo, Tex.**—A communication from the San Angelo Water, Light & Power Company, which recently purchased the property of the San Angelo Power & Street Railway Company, states that it will not extend and place the system in operation until conditions are more nearly normal. The company expects to begin operation of the line as soon as material and rolling stock can be purchased to advantage.

**Virginia Railway & Power Company, Richmond, Va.**—The Virginia Railway & Power Company has been authorized to change the gage of the tracks on its Atlantic Terminal line from Twenty-third Street to Ninety-ninth Street.

**Wheeling (W. Va.) Traction Company.**—The Wheeling Traction Company has taken over the Wellsburg, Weirton & Steubenville Traction Company's line under lease and extensive improvements will be made to the road.

## Shops and Buildings

**Northern Electric Railway, Chico, Cal.**—It is reported that the Northern Electric Railway will soon begin the construction of a string of grain warehouses along its lines in California.

**Oklahoma Union Railway, Tulsa, Okla.**—This company reports that it expects to construct a new carhouse.

**Toronto (Ont.) Suburban Railway.**—A small carhouse has been built by the Toronto Suburban Railway at the intersection of Bay and Dundas Streets, Guelph, to hold one radial car. The building is 20 ft. x 15 ft. and contains a passenger waiting room and a freight platform. It is necessary to house a car overnight and for certain hours during the day at Guelph.

## Power Houses and Substations

**British Columbia Electric Railway, Vancouver, B. C.**—Work has been begun by the British Columbia Electric Railway on the extension and reconstruction of its Point Grey substation at King Edward Avenue, which will increase the equipment for feeding the railway lines in Kitsilano, Fairview and Point Grey. The new building will be 100 ft. x 60 ft., of reinforced concrete construction.

**Shore Line Electric Railway, Norwich, Conn.**—The Public Utilities Commission of Connecticut has granted permission to the Shore Line Electric Railway to furnish electricity to the Groton Iron Works, a large shipbuilding plant, for manufacturing purposes.

**Woodstock Electric Railway, Light & Power Company, Woodstock, N. B.**—This company is contemplating improvements to its plant this summer, including the installation of a Hercules turbine, type D of the Holyoke Manufacturing Company, developing 137½ hp. at 13 ft. head, belt-connected to a Westinghouse generator in synchronism with two other generators.

**Oklahoma Union Railway, Tulsa, Okla.**—This company reports that it will construct a new substation.

**Harrisburg (Pa.) Railways.**—Automatic stokers are being installed under the boilers at the power plant of the Harrisburg Railways so that river coal can be used entirely for firing. At present river coal is mixed with bituminous coal, but with the new equipment the entire fuel supply can be obtained in the city. Contracts have already been let to owners of coal fleets operating in the Susquehanna River at this point.

**Reading Transit & Light Company, Reading, Pa.**—This company has received a large shipment of insulators to be used on its high-tension line from Lebanon to Reading.

**Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.**—A report from this company states that it has awarded a contract to A. R. Warner, Waynesboro, for the erection of a brick and concrete substation.

**Virginia Railway & Power Company, Richmond, Va.**—Plans are being made by the Virginia Railway & Power Company to erect an electric transmission line from Petersburg to Norfolk to supply electricity in Petersburg and Norfolk and to the towns between the two cities. The cost of the work is estimated at about \$750,000. Contracts, it is understood, will soon be awarded for the proposed work. The proposed line will provide connections with the three power plants in the cities of Richmond, Norfolk and Petersburg. In case of any accidents to any of the plants service can be supplied by the two other stations.



# Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

## Maintenance and Replacements Chief Concern

**Situation Reflected in the Purchase by Railway Companies of Repair Equipment and Material**

Probably for the whole of the past year or longer, and surely for the last nine months, the major part of equipment purchased by electric railways has been for maintenance or replacements. Conditions have been such that, with few exceptions, traction companies for many reasons, were compelled to husband their available working capital by economizing in every possible direction. A glance over the files of the *ELECTRIC RAILWAY JOURNAL* for 1917 to date will reveal the fact that the orders for new rolling stock were few and, as compared with former periods, far between, or, as an accessory manufacturer phrased it, more cars were bought and equipped in two months in normal times than are now ordered in a year. This, perhaps, may savor slightly of exaggeration, as an expression of the seller's personal experience.

Recently, however, for special reasons, a quantity of new cars has been purchased and are now on delivery. For a while it appeared as if the car builders were in no position to accept business for early, let alone prompt, delivery, on account of being engaged on government work. The situation has, however, greatly improved.

Diligent inquiry among all classes of railway equipment, supplies and accessory manufacturers and sales agents, from time to time, proves the statement that for a year or more the bulk of the buying has been confined almost exclusively to auxiliary machinery, apparatus, appliance, tools, etc., required to maintain the power house, substation, transmission lines, rails and roadbed in a proper state of efficiency. A careful survey of the situation, fortified by first-hand information, compelled the conclusion that manufacturers and sellers of track welders and welding apparatus of every description were doing quite a brisk business for at least a year past. Ordinarily sales of this class of machinery—of substantial, rugged build, fitting the work for which they were adapted, and therefore almost as long-lived as an ordinary safe—are slow but steady. In fact, a road possessing a welder of the most approved type would frequently be in a position to lease its apparatus or perform the work under contract for other railways, in addition to keeping its own track in condition. A number of improved, simplified welding machines, which expedite and lower the cost of

the work, have also appeared in the market. This, in a measure, stimulated the demand.

Other items for repairing and rehabilitating the general equipment commanded attention, such as rail grinders and supplies, soldering and brazing apparatus, measuring, testing and recording instruments, rail joints, rail bonds and rail bonding outfits, junction boxes, line material, machine and hand tools, splicers, track drills, guy anchors, brackets and crossarms, poles, axle straighteners, car-wheel boring tools, rail-bending and straightening machines, bond testers, brakes, brake systems and brake parts, bell, trolley and register cord, cutting machines, trolley wires, cables, wheel-truing shoes, track scrapers, spikes, bolts, nuts, rivets, tieplates, angle bars, relaying rails, car trimmings, repair shop appliances and many other minor but necessary articles.

In not a few instances second-hand equipment has been eagerly sought, as it represented a lighter investment. This is especially true of motors, converters, controllers and other important parts, not to mention cars, for which the entire country was scoured. If reliable reports may be depended upon, there are few, if any, second-hand passenger cars—motor or trailer—out of service anywhere that have not been purchased by some traction road unable either financially or otherwise to acquire new rolling stock.

The character of the present market is well known to every manufacturer and sales agency of rolling stock, equipment and supplies. Their comments on the situation at times have been more forcible than elegant; for the dearth of regular railway trade has been at so low a state that some of the well-known houses have been seeking business in other fields, with more or less success. It is therefore almost superfluous to add they would welcome the day when the traction railways should again be in position to operate and maintain their respective properties on a high plane, in keeping with their public usefulness and importance.

Not a few roads have been so hard pushed for money that they have been forced to let their property and equipment deteriorate to a considerable extent. Rehabilitation will soon be necessary. Those roads that operate in places where government employees or shipyard workers must be transported will probably be the first to be in a position to make long-needed repairs. Certain it is, however, that there is a large maintenance and replacement market awaiting proper financial conditions.

## Car Window Glass Discounts Again Shrink

**Orders Filled 100 Per Cent—Factories on Half Time—Deliveries Depend on Restrictions**

Another slight advance was made in car window glass on Feb. 11 and is now the ruling figure. The previous increase of 15 per cent, effective as of Feb. 7, was announced in the *ELECTRIC RAILWAY JOURNAL* of Feb. 23. Shortly afterward the Fuel Administrator had a survey made of the glass industry, which showed that production during the year probably would far outstrip the demand. To conserve fuel the manufacturers were ordered to curtail their production 50 per cent, and the factories are operating on that basis.

As a rule car window glass is sold through the jobber, who for some time had been expecting higher prices. They therefore advised purchasing agents to cover their immediate requirements and estimated wants for next season as soon as possible. Following this discounts shrunk, varying with point of shipment, quotations being f.o.b. plant. Car windows are nearly all of the grade known as double strength AA, on which the manufacturer's discounts are now 71 per cent off list for first quality and 80 per cent on second quality. Orders are filled 100 per cent, but deliveries are subject to embargoes and the necessary priority certificate for shipments coming through the consignee.

## Railway Costs Higher in the Far West

**Pacific Roads Unable to Take Advantage of Market Conditions—Freight Situation Burdensome**

While it is well known that prices have advanced to an extent never before experienced, that deliveries have never been known to be worse, these conditions apparently are not the same throughout the country. The situation in these respects on the Pacific Coast are particularly severe, according to advices from the San Francisco representative of the *ELECTRIC RAILWAY JOURNAL*.

Electric railways of the Pacific Coast have to meet several costs which do not appear in the operating expenses of systems in Eastern cities. One of the most serious of these is the disadvantage when purchasing material and equipment of being unable to take advantage of market conditions. The Eastern road, through close touch with

manufacturing conditions, can usually buy to advantage by getting its orders in when prices are low. Western roads have always been under a disadvantage in this regard because of the necessity for placing orders at long range, but now with terms of delivery much longer than before, the disadvantage is increased.

Another item is the difference in terms. Bills are usually rendered with cash discounts for ten or thirty days from date of invoice. If the shipment is to a road in the Far West it may now be anywhere from one to four months before the consignment is received. Thus, in order to take advantage of the discounts, payment must be made long before the equipment arrives.

## Varnish and Paint Prices Advance

### Increases Due to Rising Cost of Raw Material—Railway Enamel Is Growing in Favor

Varnish and paint manufacturers who specialize in railway paints and varnishes declare the field to be one in which specialization is necessary. Nevertheless, they are enthusiasts, even to the chemists, compounders and experts, on the proposition. As one of the many well-known manufacturers says, "No field of endeavor has greater need for specialization than the manufacture and use of railway and electric railway paints and varnishes. In no branch of the business does the chemist and his testing experts meet with more variable and exacting conditions. Every conceivable kind of surface must be protected or beautified, or both. Furthermore, this endless variety of surfaces must be prepared to withstand the gruelling of severe travel and exposure."

Late winter, early spring and the fall are the usual buying seasons, because it is the time of the year when more cars are re-shopped than any other. Some advance orders for the needs of several important electric railway properties have already been booked. Manufacturers and sales agencies anticipate a greater year than in 1917, which was the best on record in volume and values. Prices have increased from Jan. 1 to Feb. 1 from 10 to 25 per cent. In a year to a year and a half prices of paints and varnishes have advanced over 100 per cent. The basic materials, such as white lead, linseed oil, potash, etc., have been on the upward trend for a long time, and are still tending in that direction.

In addition to the regular list of varnishes and paints called for from the priming to the finishing coats, a new compound has come into use within the last three or four years. This is known as a railway enamel, and is made and sold under different names by all the leading manufacturers. As one firm explains, "railway enamel is the crowning achievement of the combined efforts of expert painters to produce a finishing enamel." It is known as a full-oil enamel. No gums enter into its construction. This insures it against

The higher freight rate on l.c.l. shipments makes it desirable to get together carload lots to secure the lower rates whenever possible. This tendency has been an additional reason for carrying a comparatively large stock of extras where such long delays are experienced in getting deliveries from the East. When this is necessary to insure dependability of service the capital tied up thereby of course must be charged to operating expenses.

Such points as these, considered collectively, constitute a considerable financial burden, and are looked upon by western roads as more than offsetting the climatic advantage which they have over eastern roads in the matter of operating conditions.

eventually becoming brittle and then cracking.

This railway enamel, now coming into more general use, is admitted by car builders, managers of railway repair departments and practical car painters, not to mention paint manufacturers of repute, as wearing longer than other finishing varnishes. Besides, its employment reduces the cost of material to a minimum. Still more important, in the matter of time in applying the various coats, including rubbing and finishing varnishes, a saving of 50 per cent is effected. The quality, the makers assert, is as good if not better than the average high-grade car varnish. As an evidence of its popularity one manufacturer may be cited as having sixteen standard car body colors, and, it is presumed, others are equally well provided. Some are known as traction orange and green, interurban green, etc. At any rate, reports bear out the assertion that many electric road superintendents of rolling stock consider this enamel one of the best finishing products in point of appearance, service and wear, under all weather conditions, that has been introduced in years. The leading railway lines in the New York district are heavy buyers of the specialty.

Managers of the car-painting departments of several of the larger companies are in the habit of buying colors and making up their own finishing enamels. This has its advantages, but the great majority of the companies purchase their supplies ready mixed. Some of the important properties buy in bulk; that is, in barrel lots. One manufacturer with wide experience stated, however, that it was a peculiarity of the traction companies to provide for their requirements in five-gallon can lots. The ultimate quantity was about the same as if buying by the barrel, simply the can package seemed to appeal to this class of buyers.

Quotations were not being made very far ahead. On clear varnish one company has accepted a few orders at six months' delivery. Colors, customarily

taken on contract for six months or a year, are now greatly restricted for the immediate future. The market situation is constantly fluctuating and is described as too uncertain. Raw material, while in fair supply, is none too ample. Potash, an essential ingredient from several points of view, is a bothering proposition, as almost the entire world's supply came from Germany, which is now completely cut off. A domestic substitute is being developed, but as yet the quantity is comparatively small and, to quote an authority, not altogether to be depended upon. Eventually this will no doubt be remedied. Potash is therefore on a high price level. Linseed oil, another important base, is appreciating in cost continually. Transportation and other prime contributing conditions are playing havoc with this line. Labor scarcity has resulted in factory production being curtailed somewhat. Under these circumstances manufacturers advise that traction companies anticipate their wants as far as possible in order to avoid the predicted inevitability of still higher prices.

Deliveries, with embargoes yet in force, are mentioned with reservations. Shipping dates, providing cars can be obtained, may be arranged; but the arrival of goods at destination, even with more favorable weather, cannot be guaranteed, and doubtless a priority order may be a requisite in addition, excepting to nearby points of factory. Besides, a great many paints are not carried in stock, because they deteriorate by the very nature of their composition, and therefore time must be allowed for manufacturing. On deliveries one manufacturer said he had had three cars of paints coming into New York from the Middle West since Jan. 14, and they were still in transit; also a shipment from Philadelphia that took three weeks to arrive. Local trucks that normally cost \$8 a day now command \$12. It is therefore declared that these items must necessarily figure in the ultimate cost of the merchandise.

### Rolling Stock

Aberdeen (S. D.) Railroad recently obtained a new snowplow.

Aurora, Elgin & Chicago Railway, Aurora, Ill., recently purchased six cars from the Cincinnati Car Company, to be used for city and short interurban system runs.

Columbus Railway, Power & Light Company, Columbus, Ga., through Howard W. Clapp, general superintendent, advises that it "is not purchasing any new car equipment at this time." The report referred to appeared in the ELECTRIC RAILWAY JOURNAL of Feb. 23.

Cleveland (Ohio) Railway has been supplied with twenty-five trail cars, mounted on Brill 67-F trucks, built by the G. C. Kuhlman Company, Cleveland. Total passenger capacity, standing and seated, 130.

State Belt Electric Street Railway, Pen Argyl, Pa., which finished 15 miles of trackage from the Wind Gap to Stroudsburg, Pa., during 1917, had four interurban cars recently shipped from the J. G. Brill Company, Philadelphia. The cars have Brill 27-M, C.B.2-x trucks, 6-ft. wheelbase and 33-in. wheels, and are constructed with all-steel framing and sheathing. Mahogany is used for the interior finish, including all doors, sashes and moldings. Seating capacity, forty-six.

Philadelphia (Pa.) Rapid Transit Company, which recently ordered 100 new cars from the J. G. Brill Company, as referred to in the ELECTRIC RAILWAY JOURNAL of March 9 and previously, furnishes the appended specifications. The order was assumed as coming through the Emergency Fleet Corporation.

Number of cars.....	100
Name of road.....	Philadelphia R. C. Co.
Date order was placed.....	Feb. 1, 1918
Date of delivery.....	Commencing 90 days
Builder of car body.....	The J. G. Brill Co.
Type of car.....	Closed passenger
Seating capacity.....	48
Weight (total).....	44,000 lb.
Bolster centers, length.....	21 ft. 0 in.
Length over bumpers.....	45 ft. 6 in.
Length over vestibule.....	44 ft. 6 in.
Width over all.....	8 ft. 6 in.
Height, rail to trolley base.....	11 ft. 8 in.
Body.....	Semi-steel
Interior trim.....	Cherry
Headlining.....	Nevasplit
Roof.....	Arch
Air brakes.....	General Electric
Axles.....	Valley steel heat treated
Bumpers.....	Brill channel iron
Car trimmings.....	Brass (Brill)
Conduits and junction boxes.....	General Elec.
Control, type.....	G. E. P. C.
Couplers.....	Tomlinson air and electric
Curtain fixtures.....	Forsyth No. 88 and Rex rollers
Curtain material.....	Pantasote
Designation signs.....	Hunter illuminated
Door operating mechanism.....	National-Pneumatic
Fenders or wheelguards.....	H-B Life Guards
Gears and pinions.....	Tool Steel Gear Co.
Hand brakes.....	National Staffless
Heaters.....	Peter Smith Electric
Headlights.....	Ohio Brass Co.
Journal boxes.....	Brill
Lightning arresters.....	General Electric
Motors.....	4 General Electric 247-C
Paint.....	Inside
Registers.....	Brill Standard
Sanders.....	Air—Ohio Brass Co.
Sash fixtures.....	Edwards
Seats, style.....	Longitudinal
Seating material.....	Cherry
Springs.....	Brill
Step treads.....	Universal
Trolley retrievers.....	Ohio Brass Co.
Trolley base.....	Wasson
Trucks, type.....	Brill 77E1
Ventilators.....	Garland C-2 Honeycomb
Wheels.....	33-in. rolled steel
Tail lights.....	Nicholas-Lintern
Slack adjusters.....	Anderson
Side bearings.....	Perry
Outer plates.....	Brill oil retaining

Capital Traction Company, Washington, D. C., mentioned in the ELECTRIC RAILWAY JOURNAL of March 2 as being in the market for rolling stock, on March 12 placed an order with the J. G. Brill Company for twenty 44-ft. closed passenger cars.

Omaha, Lincoln & Beatrice Railway, Lincoln, Neb., has had recent shipments of new cars from the American Car Company, St. Louis, Mo. The cars are of the pay-within type, mounted on Brill double-motor 7-E-1 trucks, equipped with 24-in. wheels with a seating capacity of forty. The framing is of composite steel and wood.

Cumberland County Power & Light Company, Portland, Me., has been furnished eight double-truck, center-entrance trail cars by the Wason Manufacturing Company, Springfield, Mass. The trucks are of the Brill 53-F type, with a wheelbase of 5 ft., and 22-in. wheels. The bodies are framed and sheathed in steel and are of the stepless type.

Murphysboro & Southern Illinois Railway, Murphysboro, Ill., having completed its 8-mile line between Murphysboro and Carbondale, commenced operation with an initial equipment of handsome cars built by the American Car Company, St. Louis, Mo. The rolling stock is double-end operated, steel-frame cars for straight passenger service, with a seating capacity of fifty. The cars are mounted on Brill 27-M. C.B. high-speed trucks, and have a toilet and motorman's cab at one end in diagonally opposite corners. The wheelbase of the trucks is 6 ft., with 33-in. wheels.

Wheeling (W. Va.) Traction Company has taken over the Steubenville, Wellsburg & Weirton Railway Company, Wellsburg, W. Va., and has placed orders for fifty-two new all steel pay-as-you-enter cars, to cost \$200,000. The new cars will replace the rolling stock recently destroyed when the Bay Island carhouses were burned. Twenty-nine of these cars will replace those lost in the fire. Fourteen will arrive within the next thirty days and the remainder in at least four months. Contracts for construction and delivery of the rolling stock have been awarded to the Jewett (Ohio) Car Company and the Cincinnati (Ohio) Car Company. Twenty-three cars will be added to the present

number owned and operated by the company. Their seating capacity will vary from fifty-two to seventy and the cost per car from \$12,000 to \$14,000.

## Trade Notes

Third Avenue Railway, New York, N. Y., has placed an order with the Gurney Ball Bearing Company, Jamestown, N. Y., for 150 radio-thrust bearings which are to be used on the journal boxes of the storage battery and low level cars.

Electric Railway Improvement Company, Cleveland, Ohio, is planning to give practical demonstrations of efficient rail bonding and arc welding with its portable welder and portable rheostat at the National Railway Appliances Association exhibit, to be held at the Coliseum, Chicago, March 18-21.

Drew Electric & Manufacturing Company, Indianapolis, Ind., has appointed the Northern Electric Company, Ltd., exclusive agents for Drew electric railway, light, power, gas and mine haulage material and specialties in Canada and Newfoundland. The Northern Electric Company will carry a complete stock of the Drew line in Canada for the benefit of its electric railway customers. The head office of the Northern Electric Company is at Montreal; branch houses are maintained in Montreal, Halifax, Ottawa, Toronto, Winnipeg, Regina, Calgary and Vancouver.

Interborough Rapid Transit Company, New York, N. Y., is making inquiries for 10,000 tons of rails for 1919 shipment. David W. Ross, vice-president in charge of contracts and supplies, informed the ELECTRIC RAILWAY JOURNAL that the company had an ample supply of rails for 1919 requirements, but it was the practice to keep its stock up to an established standard of quantity, and the inquiry was sent out to ascertain whether deliveries could be guaranteed for next year. The negotiations only covered the needs of the subway and elevated systems, and did not include those of the New York Railways Company, the surface lines which the company controls and operates.

## RAILWAY MATERIALS

	March 6	March 13
Rubber-covered wire base, New York, cents per lb.	30	27-30
Weatherproof wire (100 lb. lots), cents per lb.		
New York.....	28 1/4 to 34 1/4	28 1/4 to 34 1/4
Weatherproof wire (100 lb. lots), cents per lb.		
Chicago.....	33.42 to 38.35	33.42 to 38.35
Rails, heavy, Bessemer, Pittsburgh.....	\$55.00	\$55.00
Rails, heavy, O. H. Pittsburgh, per gross ton.....	\$57.00	\$57.00
Wire nails, Pittsburgh, per 100 lb.....	\$3.50	\$3.50
Railroad spikes, 9/16 in., Pittsburgh, per 100 lb.....	\$3.90	\$3.90
Steel bars, Pittsburgh, per 100 lb.....	\$5.00	\$5.06
Sheet iron, black (24 gage), Pittsburgh, per 100 lb.....	\$4.85	\$4.90
Sheet iron, galvanized (24 gage), Pittsburgh, per 100 lb.....	\$5.80	\$5.80
Galvanized barbed wire, Pittsburgh, cents per lb.....	\$4.35	\$4.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.....	\$3.95	\$3.95
Cement (carload lots), New York, per bbl.....	\$2.25	\$2.25
Cement (carload lots), Chicago, per bbl.....	\$2.31	\$2.31
Cement (carload lots), Seattle, per bbl.....	\$2.65	\$2.65
Linseed oil (raw, 5 bbl. lots), New York, per gal.....	\$1.43	\$1.53
Linseed oil (boiled, 5 bbl. lots), New York, per gal.....	\$1.44	\$1.54
White lead (100 lb. keg), New York, cents per lb.....	10	10
Turpentine (bbl. lots), New York, cents per gal.....	45 1/2	44 1/2

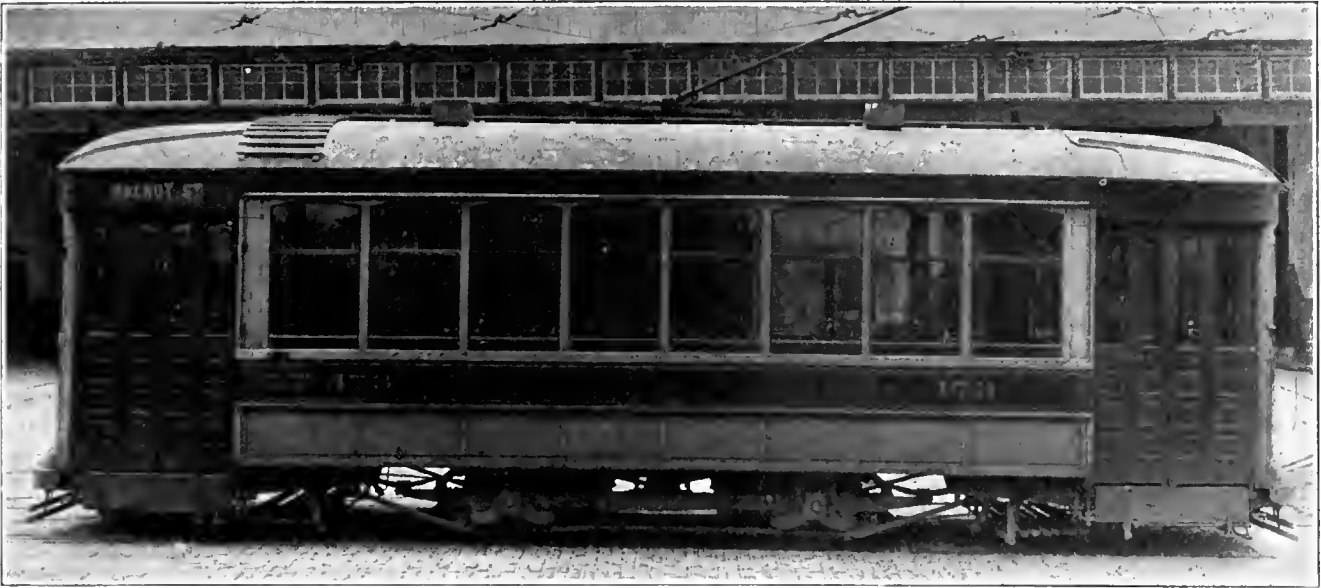
\*Nominal. †Governmental price in 50-ton lots, f.o.b. plant.

## NEW YORK METAL MARKET PRICES

	March 6	March 13
Copper, ingots, cents per lb.....	23 1/2	23 1/2
Copper wire base, cents per lb.....	*27	26.25 to 26.75
Lead, cents per lb.....	7 1/4	7 1/4
Nickel, cents per lb.....	50	50
Spelter, cents per lb.....	7.875	7.75
Tin, Straits, cents per lb.....	*85.00	*85.00
Aluminum, 98 to 99 per cent, cents per lb.....	†32	†32

## OLD METAL PRICES—NEW YORK

	March 6	March 13
Heavy copper, cents per lb.....	22	22
Light copper, cents per lb.....	19 1/2	19 1/2
Red brass, cents per lb.....	18	18
Yellow brass, cents per lb.....	13	13
Lead, heavy, cents per lb.....	6	6
Zinc, cents per lb.....	5 1/2	5 1/2
Steel car axles, Chicago, per net ton.....	\$42.41	\$42.41
Old car wheels, Chicago, per gross ton.....	\$42.41	\$42.41
Steel rails (scrap), Chicago, per gross ton.....	\$30.00	\$30.00
Steel rails (relaying), Chicago, per gross ton.....	\$35.00	\$60.00
Machine shop turnings, Chicago, per net ton.....	\$17.00	\$17.00



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# Partially Decayed Poles May Be Repaired

Quite often telephone- and electric-transmission lines are weakened by decay having attacked a comparatively small number of poles; not sufficient to require immediate reconstruction, but enough to create a hazard. (Figure 1.)

It is economical to reinforce such poles and prolong their life equal to the period of service that is expected from the majority of the poles in the line. Methods of reinforcing must naturally conform to the individual conditions encountered in each case. The following suggestions apply generally:

- (1) A thorough inspection of all poles in the line is imperative. Poles should be tested for "hollow heart," condition above and below the ground-line, condition of tops, gains, and cross-arms.
- (2) Poles affected by "hollow heart," or the interior of which has begun to rot, must be replaced.
- (3) The decayed wood must be entirely removed, chopped or shaved away until sound wood is exposed.
- (4) The minimum circumference of pole, after removal of the rotted shell,



at a point between 6 inches and 12 inches below the ground-line, when properly reinforced, must be sufficient to safely carry the required load.

(5) **Concrete Reinforcing**—After removal of the decayed wood, the section to be reinforced should be permitted to dry. Then an application of two coats of Carbosota Creosote Oil (Heated to 150° F.), should be made to that portion of the pole extending from at least 12 inches

above to at least 6 inches below the area which will be covered by the reinforcing materials. The first coat of creosote oil should be reasonably dry before applying the second.

Upon completion of the preservative treatment, and after the creosoted surface has thoroughly dried, the reinforcing rods and wire should be set and the concrete poured. (See figure 2.) A fairly rich mixture is recommended.

When concrete has set, a heavy coat of Barrett's Pitch should be applied to the top of the concrete and extend at least 6 inches up the pole. (Figure 3.)

(6) **Reinforcing with Creosoted Pole-Stubs**—After removal of decayed wood the preservative treatment should be applied in the same manner as described in paragraph 5, excepting that the area to be creosoted should extend from at least 12 inches above the ground line to at least 6 inches below the section operated on.

The reinforcing pole-stub should be cleaned of all adhering inner bark and other foreign substance, and creosoted by the application of two coats of Carbosota (heated to 150° F.). It should be firmly set into the earth and securely wired or bolted to the pole. (See figure 4.)

Upon completion of the preservative treatment, the earth is to be filled in and tamped around the hole.

Of these methods the former is somewhat expensive, and its employment probably limited to poles located in paved streets of cities and towns, and to such which carry costly special work. The latter is both simple and inexpensive and may be used wherever possible objections to appearance need not be considered.

(Green wood cannot be effectively creosoted by non-pressure processes. It should be air-dry. In regions of moist, warm climate, wood of some species may start to decay before it can be air-dried. Exception should be made in such cases, and treatment modified accordingly.)

Technical assistance in applying these suggestions to individual conditions, as well as any other information regarding the Carbosota treatment, may be obtained gratis by addressing nearest office.

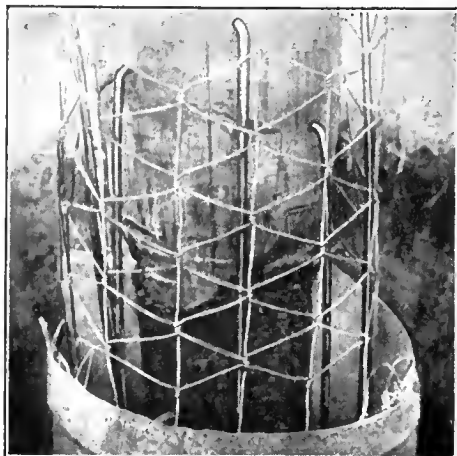
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Vancouver	St. John, N. B.	Halifax, N. S.	Sydney, N. S.		



(Courtesy Electrical World)  
Fig. 1—Partially decayed pole which could be reinforced economically.

Fig. 3—Pole strengthened by concrete reinforcing, showing waterproofing coat of pitch.



(Courtesy Electrical World)  
Fig. 2—Reinforcing rods and molds in place ready for pouring concrete.



(Courtesy U. S. Forest Products Laboratory)  
Fig. 4—Pole reinforced with creosote stub.

## Utilities Must Be Maintained

**P**RESIDENT WILSON has spoken once more, with his usual incomparable breadth of vision and clear-cut understanding of fundamentals.

It is the vital importance of utilities to-day to which he has now directed his attention. He realizes their value and their needs.

Here is what President Wilson says, in a letter on Feb. 19, to the Secretary of the Treasury:

"I fully share the views you express regarding the importance of the public service utilities as a part of our national equipment, especially in war time. It is essential that these utilities should be maintained at their maximum efficiency and that everything reasonably possible should be done with that end in view. I hope that state and local authorities, where they have not already done so, will, when the facts are properly laid before them, respond promptly to the necessities of the situation."

**Electric Railway Journal**



# DUMORE

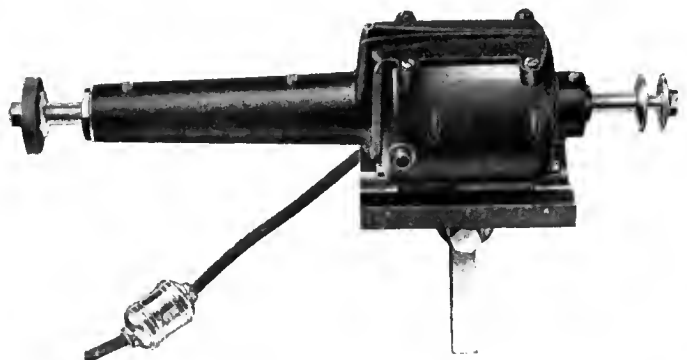
## PORTABLE ELECTRIC GRINDER

The DUMORE sets a new record for speed—one that no other portable grinder can touch—30,000 r.p.m. on the internal spindle, 10,000 r.p.m. on the main spindle. *Extremely accurate work guaranteed.* SKF Ball Bearings instead of plain bearings. Dynamically balanced armature. Send for a DUMORE *on approval*—set it up in one of your lathes, shapers or milling machines and see how quickly and accurately it does the work. If it doesn't make good—if it doesn't do exactly what you expect of it send it back at our expense.

### Extension Arm B

For deep internal grinding—regrinding cylinders, lapping out drawing dies and especially for large gauge work.

Speed 10,000 R.P.M. An extra attachment furnished only when specified.



### Wisconsin Electric Company

1508 Dumore Bldg.

Racine, Wisconsin

London Sales Agents:  
Canadian-American Machinery Co., Ltd., 8 Bouverie St.,  
London, E. C., England

## Kilby Manganese Special Work



Crossings, Frogs, Switches, Switch  
Stands, Rail Braces, Special Work,  
Built Up, Hardened Center or Solid  
Manganese Construction.

*Catalogue upon application*

**Kilby Frog & Switch Co.,** Birmingham,  
Alabama

## When Peace is Signed

**T**HE nations of the world will embark upon the most extensive scheme of reconstruction ever inaugurated in the history of the world. Railways, steamers, factories and agricultural implements will be needed at short notice in quantities that stagger imagination. Raw materials will change hands in thousands of tons where formerly 1000 lb. orders were a fair average.

The demand will be sudden; it will be overwhelming.

The only manufacturers to benefit will be those whose names and products are *known*, and who are *now* announcing their abilities to fill large orders.

**T**HE specialized field covered by this magazine will be second to none when the great drive for trade conquest begins—and the advertiser whose name appears regularly in its pages will be a few jumps ahead of his competitors whose names are strangers to it.

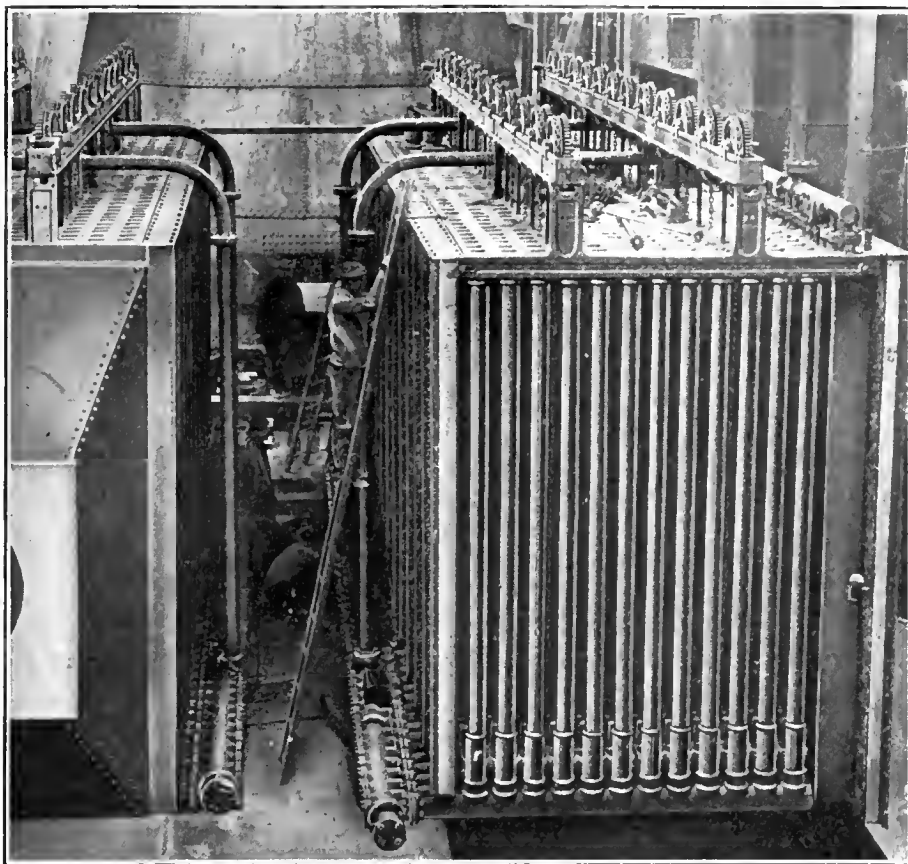
Do the big purchasing agents know you? Have they card-indexes of your ads, your catalogs?

If you are a regular advertiser in *Electric Railway Journal* you may be sure that they know all about you and your product when the moment comes for placing those rush orders!

**Electric Railway Journal**

Member Audit Bureau of Circulations

# Real Coal Conservers—



Two of the ten Green Economizers of the new plant of Buffalo General Electric Co. before placement of the steel casings.

Coal is being saved during the present crisis by hundreds of prominent plants who have had the foresight to install

## GREEN'S FUEL ECONOMIZERS

• Among these plants are the following:

Columbus Railway, Power & Lt. Co., Columbus, Ohio  
West Penn Traction Co., Connellsville, Pa.  
Kansas City Street Railways Co., Kansas City, Mo.  
Hudson & Manhattan R.R. Co., Jersey City, N. J.  
Public Service Co., Newark, N. J.

Philadelphia Rapid Transit Co., Philadelphia, Pa.  
Cleveland Municipal Plant, Cleveland, Ohio  
Omaha & Council Bluffs St. Ry. Co., Omaha, Neb.  
Denver Gas & Electric Co., Denver, Colo.  
Denver Tramways Power Co., Denver, Colo.

Portland Railway & Light Co., E. Portland, Oregon

The saving at the plant of the Buffalo General Electric Co. made by heating the feed water with the waste products of combustion amounts to approximately 13 per cent of the coal fired. Our engineers are ready to extend their help in planning and estimating the cost of installing these economizers in your plant.

## THE GREEN FUEL ECONOMIZER CO.

BEACON, N.Y.



## The Coon Who Had a Quarter



**A** SOUTHERN GENTLEMAN, wishing an errand done, called to a colored boy who was loafing nearby.

"George, do you want to earn a quarter?"

"No thankee, sah—I'se got a quatah."

Which reminds us of an advertiser we called upon several days ago.

"I don't need to advertise," he declared. "I've got all the business I can handle."

**T**HIS QUAIN'T PHILOSOPHY of business is one which, we are free to admit, is too deep for our comprehension. The idea that a man who has plenty today should fail to provide against the future somehow appears to us to lack logic. If that idea obtained very generally, there would be no such thing as insurance—no such thing as thrift—no such thing as education. A full belly would be the highest human ideal.

As a matter of fact, human progress is based upon exactly the opposite premise. Since the stone age

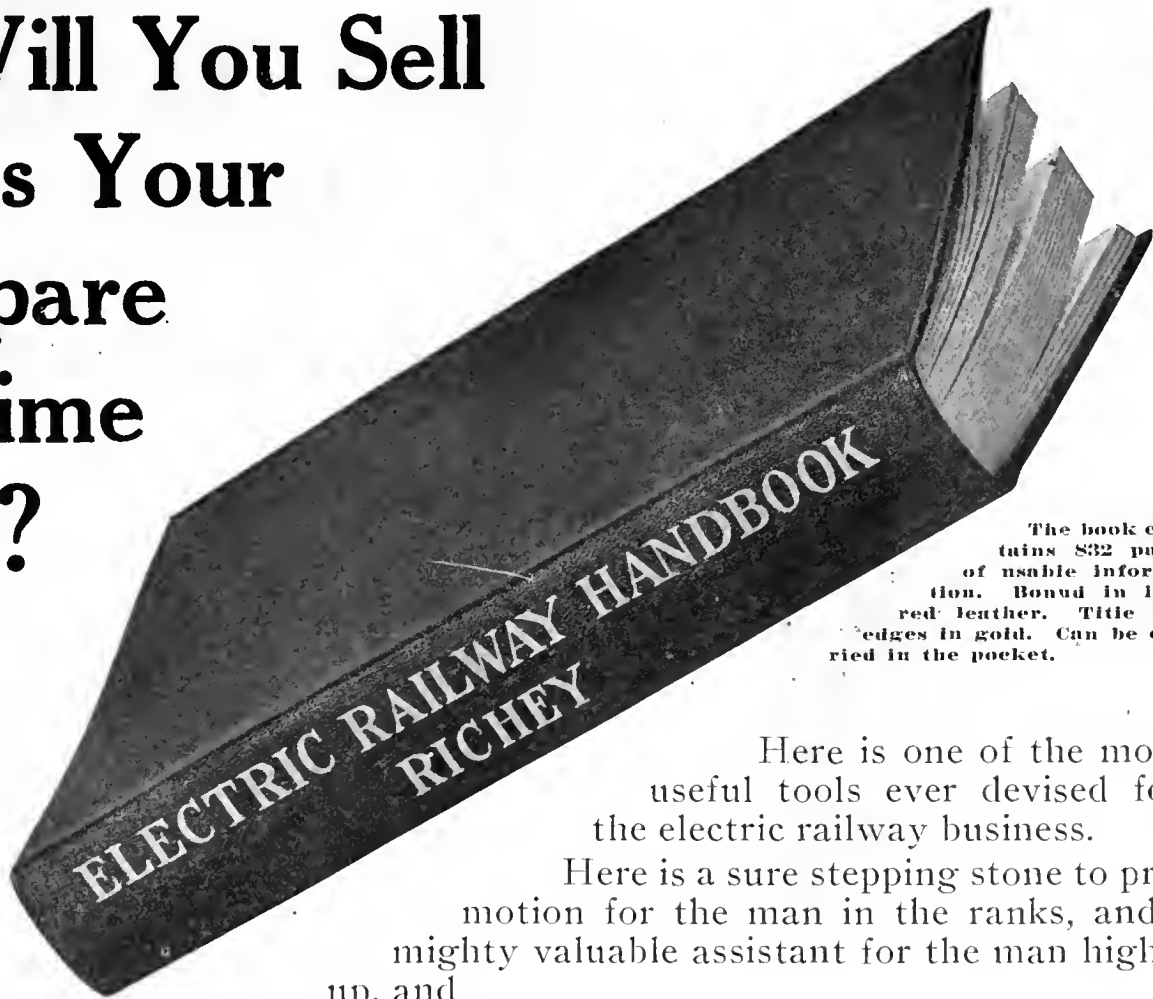
men have fought not only to provide for immediate needs but to provide for the morrow—for next winter's famine—finally, for posterity.

Advertising is more a provision for the future than a bid for immediate orders. The man who looks upon it in any other light is blind to the experience of some of the most successful men in business. We will put it stronger—the man who looks upon it in the light of purely immediate advantage is in a class with the coon who had the quarter.

**Electric Railway Journal, 10th Ave. at 36th St., New York**

Member Audit Bureau of Circulations

# Will You Sell Us Your Spare Time ?



The book contains 832 pages of usable information. Bound in limp red leather. Title and edges in gold. Can be carried in the pocket.

Here is one of the most useful tools ever devised for the electric railway business.

Here is a sure stepping stone to promotion for the man in the ranks, and a mighty valuable assistant for the man higher up, and

Here is our proposition:

We want you to sell us your spare time—perhaps an hour or two a week.

In this time we want you to bring this book to the attention of every man in your department, and every other electric railway man that you can reach. We pay a good commission. You risk nothing. The book sells itself.

Only one representative wanted in each electric railway office or shop. Be the first to get your coupon in.

*If for any reason you cannot send the coupon, please ask one of your friends to do so!*

**McGraw-Hill Book Co., Inc.**

239 West 39th Street, New York

LONDON: HILL PUBLISHING CO., Ltd.  
6 and 8 Bouverie Street, E. C.

RETURN THE COUPON TO-DAY

McGraw-Hill Book Co., Inc.  
239 W. 39th St., N. Y. C.

I may cooperate with you in selling the Richey's Electric Railway Handbook.

Send me your plan.

Signed.....

Address.....

Company.....

Position.....

Recommended by ..... E 3-16-18



# 34,403 Miles with a

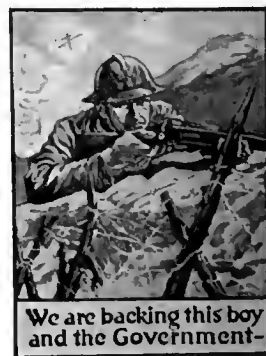
## And No Over

### *that's the Record on the Third Avenue*



In May, 1911, the Third Avenue Railway System, New York, began to use G.V. Electric Trucks. Continued satisfaction led to re-orders, the present fleet consisting of nine trucks, as follows:

	Mileage to Jan. 31, 1918
No. 15—1-Ton Misc. Service Truck, 13-plate battery.....	33,561
No. 16—2-Ton Misc. Service Truck, 17-plate battery.....	34,403
No. 17—2-Ton Truck, 17-plate battery.....	Car Equip. Dept.
No. 10—2-Ton Emergency Truck, 21-plate battery.....	18,402
No. 11—2-Ton Emergency Truck, 21-plate battery.....	18,589
No. 12—2-Ton Emergency Truck, 21-plate battery.....	Spare
No. 14—2-Ton Emergency Truck, 21-plate battery.....	19,538
No. 18—5-Ton Heavy Haulage Truck, 25-plate battery.....	25,088
No. 19—2-Ton Emergency Truck, 21-plate battery.....	15,955



## G. V. ELECT

Are the Logical Choice of

The New York Railways Co. operates 29  
Havana, Allentown, Columbus, Oh

## General Vehicle

General Office and Factory

New York, Chicago

Six Models: 1,000



# G. V. Electric Truck

## hauling Yet

### ailway System, New York City

The five emergency trucks are operated at 15 m.p.h.; the others at 10 to 12 m.p.h. One of these trucks is a spare. The daily service per truck averages 13 miles a day for every day in the year.

The 5-ton service truck averages 15 miles, the 2-ton service truck 19½ miles and the 1-ton service truck 20 miles a day. The maxima, of course, are much higher—52 miles a day by the 1-ton truck, for example.

All trucks are charged at night,

so that energy is obtained for next to nothing.

Not a single truck listed has yet required any general overhauling. Aside from accidents, bodies, chassis springs, wheels, motors and many other parts have required no repairs or renewals.



## RIC TRUCKS

e Logical Electric Railway  
s Other traction trucks in New Orleans,  
rtland, Ore., Memphis, etc.

Company, Inc.

ng Island City, New York  
oston, Philadelphia  
0,000 lb. Capacity



# Pole Maintenance Reduced 80%



Base of Pole after 7  
years in service

## Some Actual Figures

### Cost Placing 1500-lb. Pole:

New Pole .....	\$52.50
Labor in Setting.....	8.00
Hauling, etc. ....	extra
	<hr/>
	\$60.50

### Cost Rejuvenating 1500-lb. Pole:

1 Old Pole, junk.....	\$00.00
1 Drew Pole Sleeve.....	8.80
Labor, Material, Hauling, etc.....	.70
	<hr/>
	\$ 9.50

Immediate Saving per Pole Made by  
Using Drew Pole Sleeve.....\$51.00

Probable Life of Replaced Pole—7 to 10 years

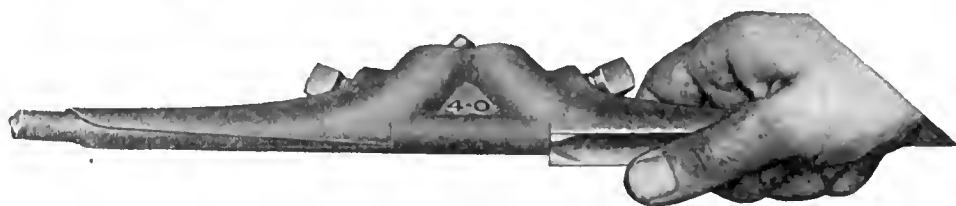
Life of Rejuvenated Pole—20 years.



Now better than new  
for at least 20 years  
more

Similar savings are within reach of every steel pole user. The method is simple and economical. Send for illustrated booklet. It will pay you to investigate.

# SAMSON SPLICERS



An Evolution in Splicer Design.

Cost Least per Car Mile.

Easy to Install—Stay upright in the Span—Non-arcng.

Drew Line Material is Standard on Many Large Roads Throughout the Country.

## DREW ELECTRIC & MFG. COMPANY

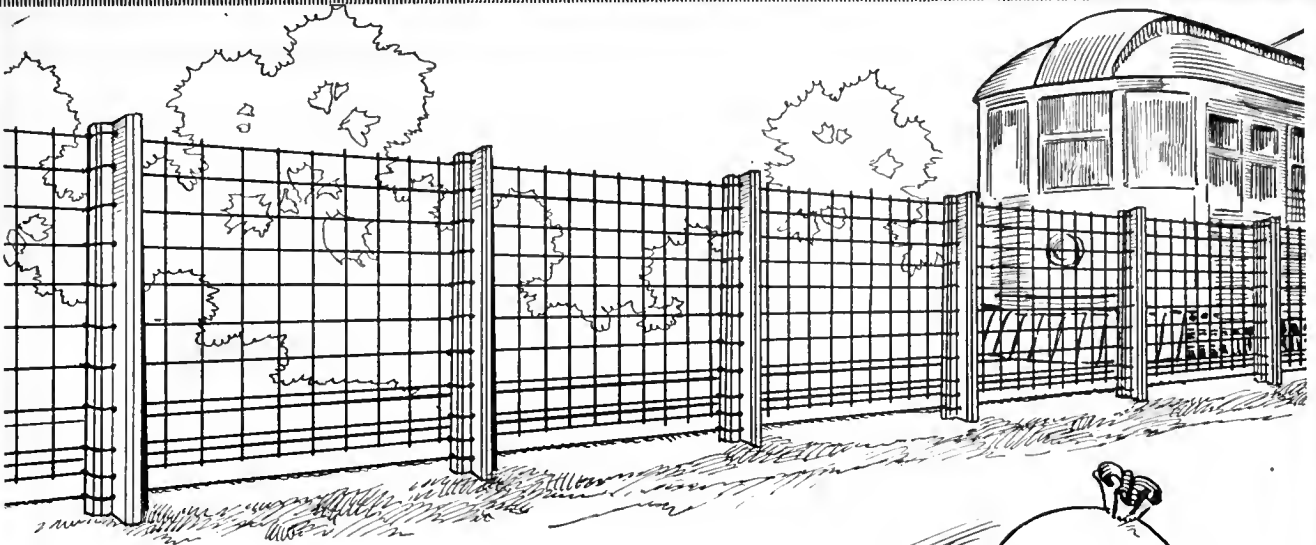
Representatives in Principal Cities

Offices and Works —

1016 E. Michigan St., Indianapolis, Ind.

**DREW**  
MEANS "SERVICE EFFICIENCY"



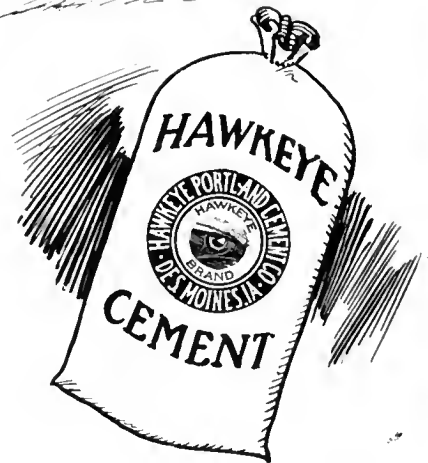


## Seven Posts to the Sack

Just to save a few dollars makeshifts are sometimes put in.

This is no time to put in a makeshift fence—and pay for it again in the future.

No time, especially when with



## STANDARD All Steel Fence Post Molds

(McELROY SYSTEM)

you can get seven standard posts out of each sack of cement—and keep your labor charge very low.

Note the T shape of the posts—a big saving there.

Assembled "Fool-proof" Towers insure uniform strength.

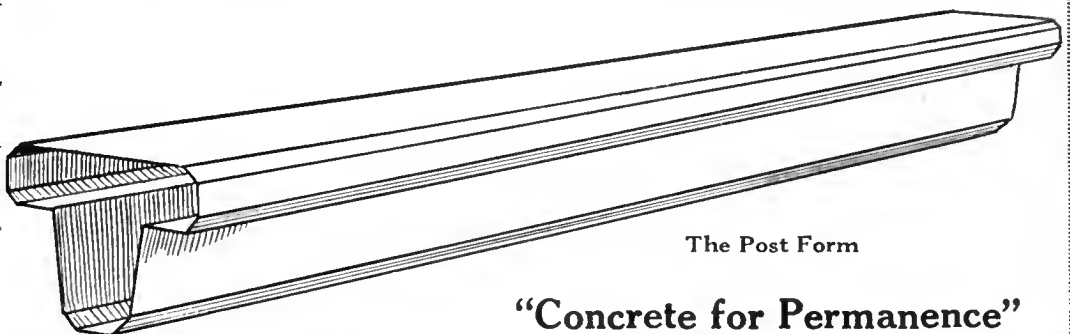
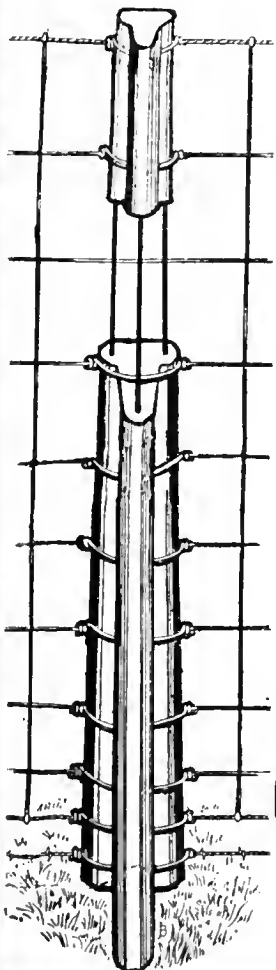
Why Experiment?

We offer you 20 years' experience as fence experts. Over 12 years of extensive manufacture of Concrete Fence Posts and Steel Moulds, handling hundreds of miles of fence contracts. More than a million posts in Iowa alone. Others in 38 States.

WE USE ONE-FOURTH-INCH ROUND DEFORMED BARS.

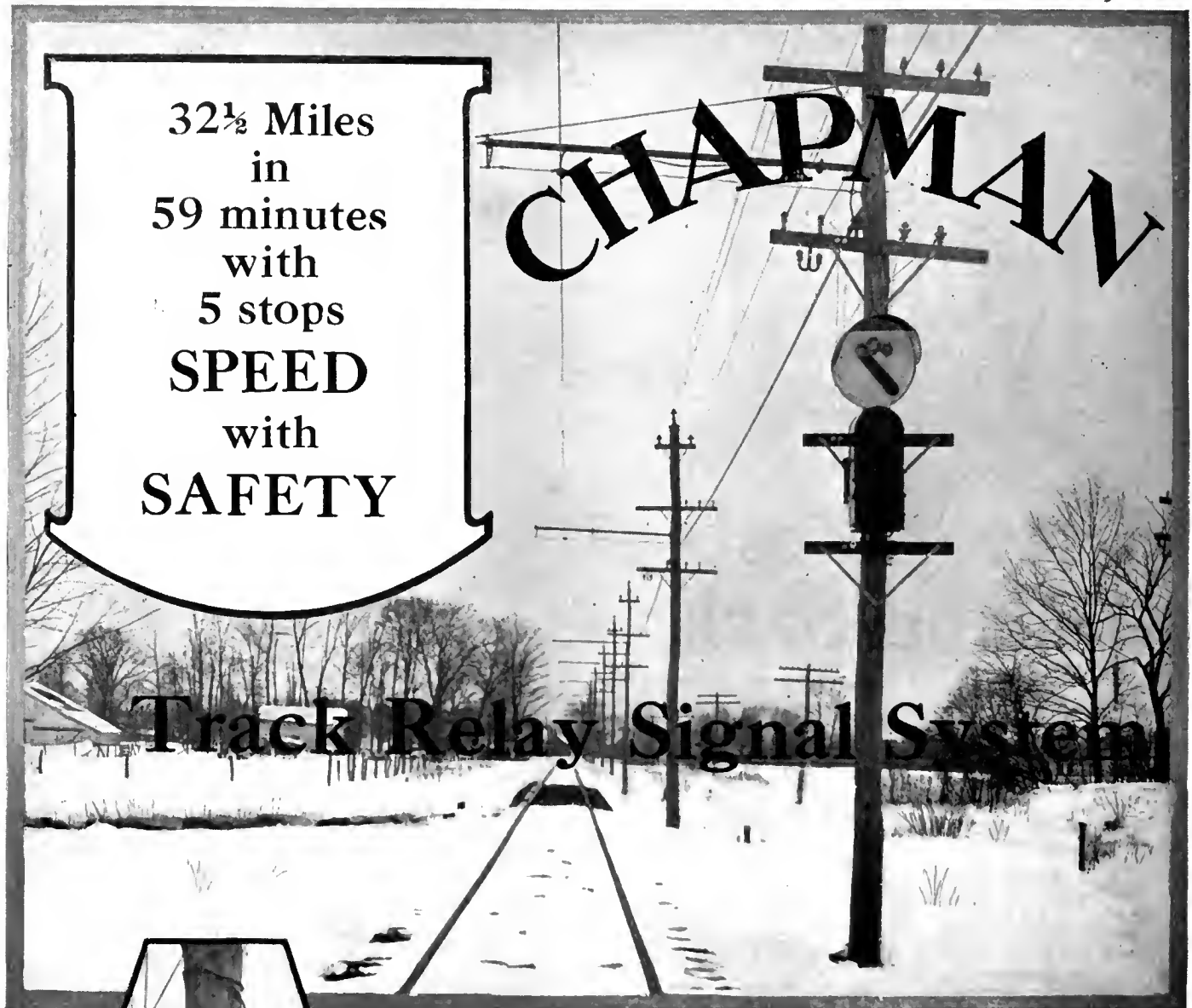
Write for full details of Standard Post Forms and Stan-Ste-MoC Building Rock Forms today.

**Standard Steel Mould Co.**  
99 Second Avenue, Cedar Rapids, Iowa



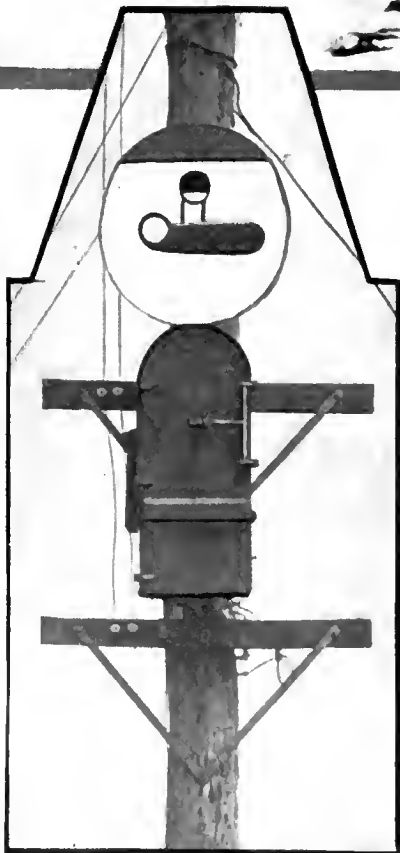
The Post Form

**"Concrete for Permanence"**



32½ Miles  
in  
59 minutes  
with  
5 stops  
**SPEED**  
with  
**SAFETY**

**Track Relay Signal System**



This photograph shows a stretch on the "Chautauqua Route" of the Jamestown, Westfield and Northwestern Railroad, where the schedule calls for 32½ miles in 59 minutes, including 5 stops.

Two 60-ft. sections of rail are insulated about 300 ft. ahead of each signal—giving the motormen time to get the indications without slowing down.

The line is used for 62 passenger trains a day in the summer season, in addition to baggage and express cars.

**Charles N. Wood Co.**

14 Federal St., Boston, Mass.

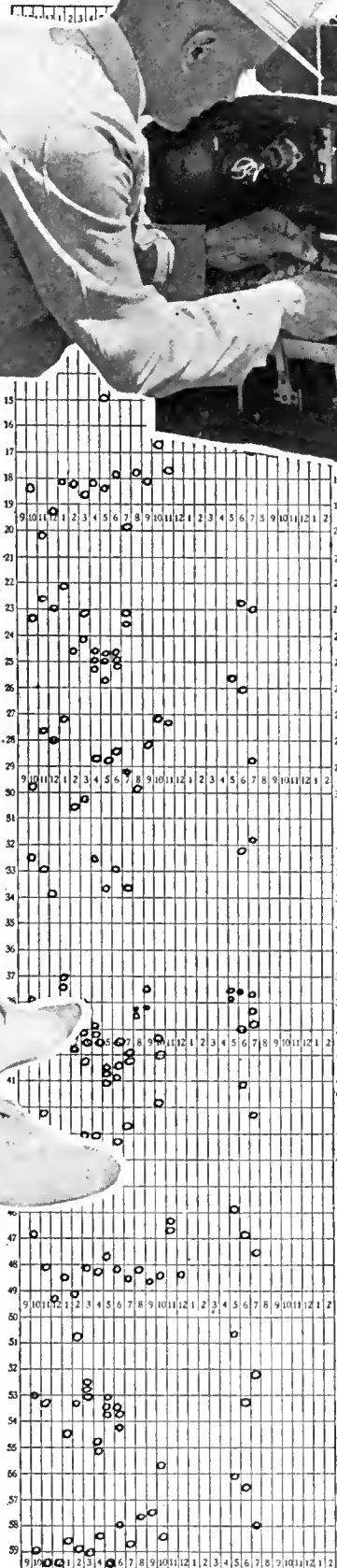
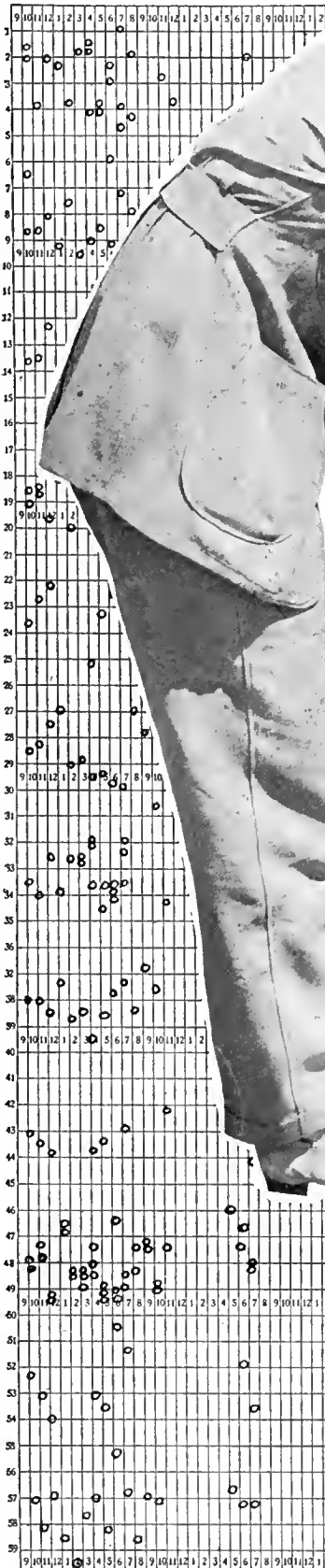
LINE Summit Ave. DATE 7-22-1917LOCATION Pennsylvania Ave.

NORTH

EAST

SOUTH

T



## A Complete Survey of Your Car Spacing

is under your immediate command with the  
autographic chart records of

## NACHOD Headway Recorders

which accurately record the time each car  
passes the selected points on the line in  
either direction during 24 hours.

They make it unnecessary to keep inspec-  
tors along the line to check schedules and  
eliminate a lot of costly clerical work.

Abnormal congestion or irregular running  
is at once detected, enabling you to investi-  
gate the causes and to remove them when  
possible. The efficiency of the various  
crews in holding the prescribed schedule is  
shown.

Nachod Signals and Crossing Bells are in  
the lead for Safety and Dependability.  
Their use by leading railway companies  
warrants their consideration for your lines.

**NACHOD SIGNAL CO., INC., 4773 Louisville Avenue, Louisville, Ky.**

Eccles & Smith, Pacific Coast Representatives, Portland, Oregon; San Francisco, Los Angeles, Cal.

# WHEN YOU NEED POLE LINE CONSTRUCTION MATERIAL

## *Western Electric*

### QUALITY PRODUCTS

will meet your requirements.

Poles — crossarms — pins — insulators—weatherproof and bare wire—pole line hardware—tools—and all of the best—are included in our ready-to-ship stocks.

Western Electric Line Construction Materials will keep down your maintenance costs—an important item in these days of increasing labor and material costs.

*Let us serve you*

## *Western Electric Company*

INCORPORATED

New York	Atlanta	Chicago	St. Louis	San Francisco
Buffalo	Savannah	Cleveland	Cincinnati	Oakland
Newark	Birmingham	Indianapolis	Kansas City	Los Angeles
Boston	New Orleans	Detroit	Omaha	Seattle
New Haven	Charlotte	Milwaukee	Oklahoma City	Portland
Philadelphia	Baltimore	Minneapolis	Dallas	Salt Lake City
Pittsburgh	Richmond	St. Paul	Houston	Denver

EQUIPMENT FOR EVERY ELECTRICAL NEED

Members Society for Electrical Development

Do it Electrically



# ANNOUNCEMENT

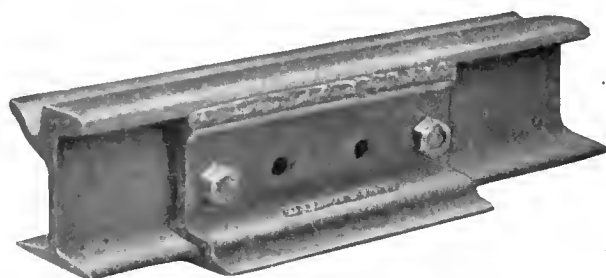
Special type joint plates are now being rolled by The Rail Joint Company. These plates are especially adapted for the production of

## Gailor Welded Rail Joints with Universal Welding Equipments

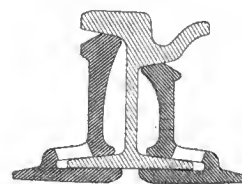
By this arrangement the cost of Gailor Joints is reduced to a still more favorable figure and the necessity of railways preparing their own plates is eliminated.

Also a special type of Continuous Joint adapted to our welding methods will be furnished if desired.

This type of continuous plate combines the advantage of the Continuous Mechanical Joint with the Gailor Welded Joint.



Arrangements for the purchase of these plates may be made direct through The Rail Joint Company or through us, or our agents, as desired.



## ATLANTIC WELDING COMPANY

30 CHURCH STREET NEW YORK

CHAS. N. WOOD CO.  
14 Federal Street, Boston, Mass.  
RAILWAY TRACK-WORK CO.  
30th & Walnut Sts., Phila., Pa.

AGENTS  
THE ELEC. ENGINEERING & MFG. CO.  
First Nat. Bank Bldg., Pittsburg, Pa.  
HOLDEN & WHITE, Inc.  
343 S. Dearborn St., Chicago, Ill.

WIGMORE HALL & CO.  
Pacific Elec. Bldg., Los Angeles, Cal.  
W. C. BURDICK  
808 First Nat. Bank Bldg.,  
Milwaukee, Wis.

Canadian Representatives: LYMAN TUBE & SUPPLY CO., Ltd.,  
Montreal Toronto Winnipeg





## Collier Service Is Both National and Local

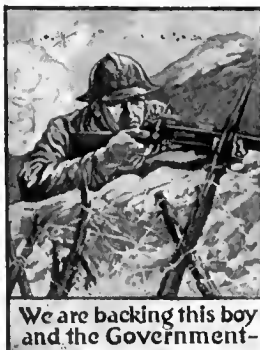
Collier Service has both national and local divisions.

The national division handles the cards of *national* advertisers, some of whom simply purchase space and carding service.

The local division comprises some seventy territorial offices each with its own set of *local* customers.

By using the New York headquarters as a clearing house these local offices co-operate most effectively in exchanging ingenious thoughts and plans to inspire Collier artists in devising new designs and Collier solicitors in working up campaigns for different industries.

Thus the experience of one Collier office, from the effect of a single card to a whole campaign, is placed at the disposal of all the other offices to the end that car card advertising produce good returns to the advertiser, thereby assuring *permanent* income to the railway from its sale of car advertising space through the medium of Collier Service.



We are backing this boy and the Government—

**Barron G. Collier**  
INCORPORATED

Candler Building

220 West 42nd Street, New York City

# Imperial OXY-ACETYLENE EQUIPMENT

## For Spring Bonding and Repair Work

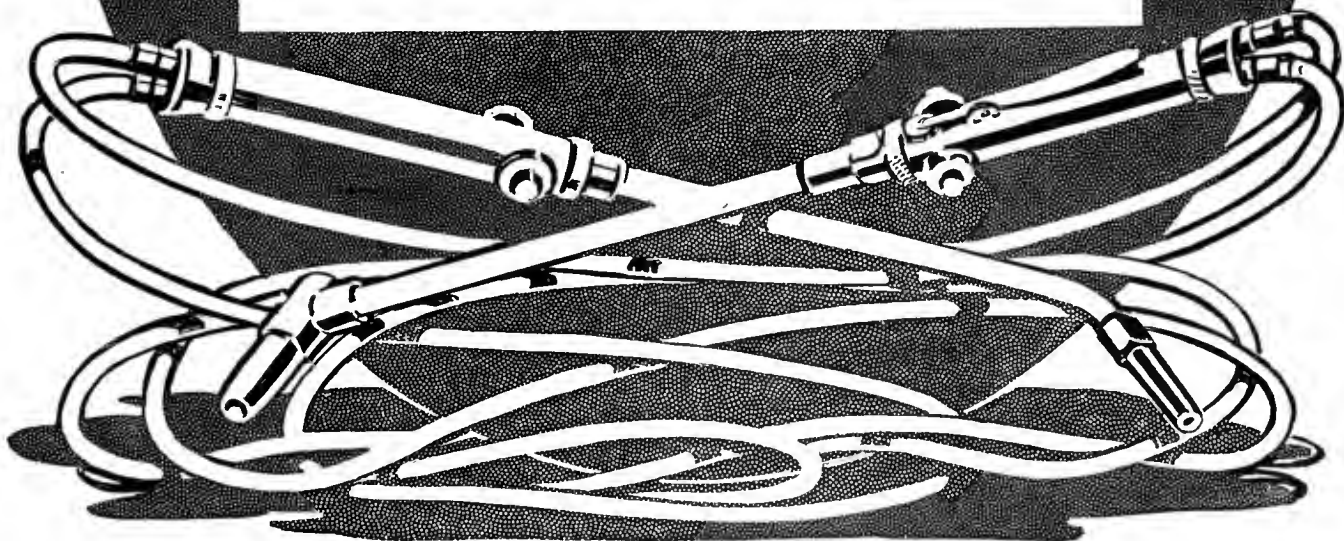
Bonding and welding metal parts of all kinds, and cutting steel rails, car frames, etc., are but a few of the unlimited uses of Imperial Equipment. Following our simple directions, any one of your mechanics, using an Imperial Outfit, can often save its cost in a single operation.

Make your own repairs, keep your cars running on schedule and maintain your profits—remember that wheels only earn while they turn. Imperial Welding and Cutting Equipment builds up cupped joints, crossings, worn frogs, etc., and does not interrupt traffic.

Imperial Equipment is Safe, Speedy, Economical and Efficient. It is durable and portable—always ready for use anywhere. Imperial mixing principle regulates and accurately controls delivery of gas, from lowest to highest pressures, daily proving itself a genuine industrial necessity.

*Our expert engineers will co-operate with you and advise fully as to the kind of equipment best suited to your needs. Write today.*

**IMPERIAL BRASS MANUFACTURING CO.**  
525 South Racine Avenue CHICAGO





# Thermit Welds Co

**T**HE American people will not soon forget the winter of 1917-18, with its enforced shut-downs of offices, of workshops—even of essential public utilities like the central station and the electric railway.

The many analyses precipitated by this crisis have proved that more intelligent use of fuel itself, or of the electric power generated from fuel, will make

## A Repetition of the Coal Famine Avoidable

In the electric railway field alone several million tons of coal can be saved annually by an operating improvement like the Skip-Stop and an engineering improvement like lower line losses.

Incidentally, as both of these improvements raise the schedule speed, their inauguration makes it possible to maintain the same service with fewer cars and men.

The Skip-Stop calls for no expense other than publicity and stop signs; the mini-



Broadway, Between 45th and 59th St., New York

## The Rail Weld That Coal-Derived Power

mizing of line losses calls only for an outlay in Thermit Welds which will be returned many times over in coal saving and better voltage conditions alone.

## METAL & THERMIT CORPORATION

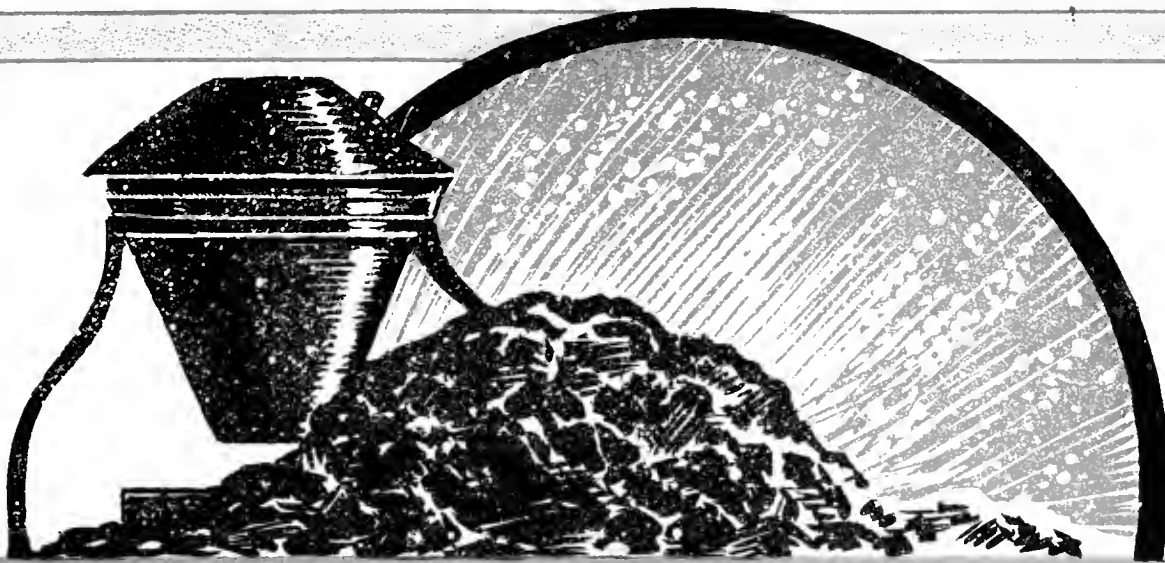
Successors to Goldschmidt Detinning Co.

329-333 Folsom St., San Francisco

7300 So. Chicago Ave., Chicago

Factories located at Chrome, N. Y.; Wyandotte





# Cost Less Than Coal



Bowery, Between Chatham Square and Bayard St., New York

## Requires Almost No for Its Installation

Better generating equipment, lighter cars are most desirable for reducing your coal requirements, but you know that it is utterly impossible to get them this

spring or summer, even if you could pay for them.

But Thermit Welding equipment and material can be shipped immediately and you will be able to

## Pay for the Welds Out of the Coal Dealer's Pocket

after installation.

Thus you will have reduced your coal supply worries by an imposing percentage.

You will have released the surplus coal and cars for the general welfare.

You will have made it possible to give faster schedules and better car lighting.

You will have done something that will please your public as well as your purse; and you will have the rail weld that requires almost no coal-derived power for its installation.

20 BROADWAY, NEW YORK

and the Goldschmidt Thermit Co.

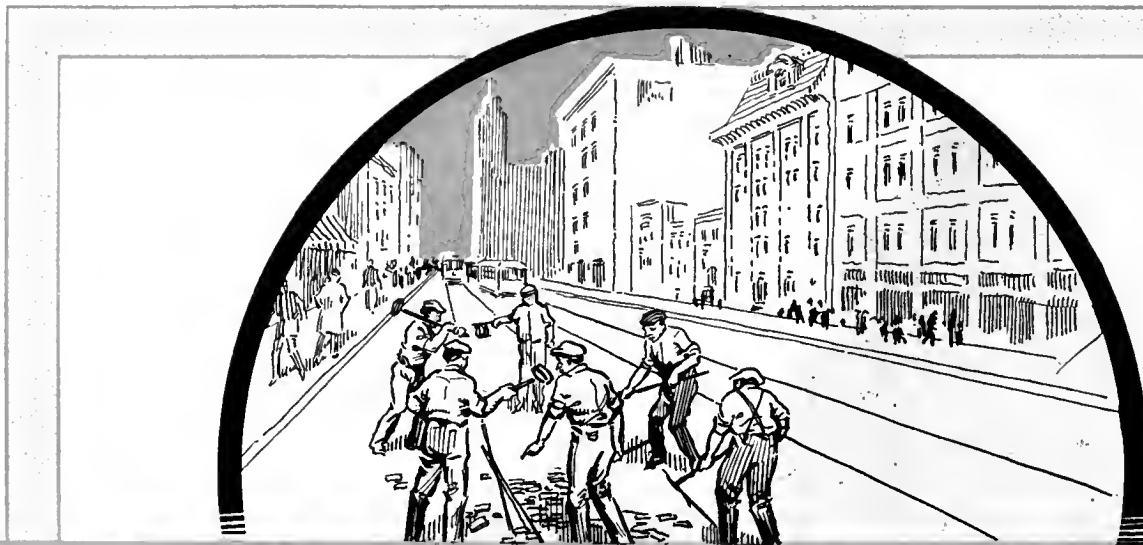
103 Richmond St., W., Toronto, Ont.

1427-1429 Western Ave., Pittsburgh, Pa.

h.; East Chicago, Ind.; Jersey City, N. J.







# Thermit Welds Co

**P**LAIN T-Rails are quoted at \$57.00 a ton—if you can get them. Girder rails are simply prohibitive, both in price and delivery. And then there are the joint plates or splice bars, the bolts, nuts, washers and other appurtenances which make the

## Mechanical Joint Track so Costly to Buy

Contrast this with the Thermit Weld, which is not only an ideal weld for new rail, but also the best you can use to extend the life of your present rail. For less than \$10.00 per weld you can save ten times that amount for new rails.

You have absolutely no new metal to buy. Cuttings made from the rails you have is the very material that goes into the Thermit Insert Weld.



Broadway, Between 72d and 96th St., New York

*The First Cost of the Thermit Weld  
in the Light of Its  
Uninterrupted*

Nothing could be simpler or give greater assurance that the rail so welded is a truly continuous structure.

## METAL & THERMIT CORPORATION

Successors to Goldschmidt Detinning Co

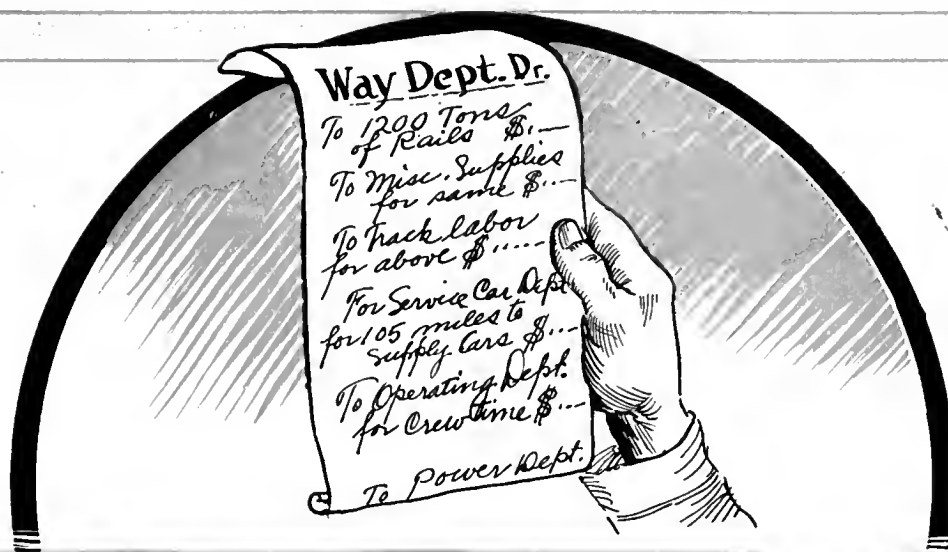
329-333 Folsom St., San Francisco

7300 So. Chicago Ave., Chicago

Factories located at Chrome, N. Y.; Wyandotte, Mo.







# st Less Than Rails



Southern Boulevard, Between 149th and Baretto St., New York

## it Weld Is Unimportant bility to Permit transportation

The salvage of your present rails is not the only engineering advantage of the Thermit Weld.

Consider the reduction in upkeep cost alone when you install a form of track construction that

### Permanently Banishes Paving Breakup at Joints

The wise track engineer knows that if paving upkeep costs were apportioned to show how much was due to breaks at joints, the management would not consider price in the installation cost of the Thermit Welds which make such paving expenses negligible.

And if the transportation and electrical value of a truly continuous rail is also taken into account, it is plain that the first cost of the Thermit Weld is unimportant in the light of its ability to permit uninterrupted transportation.

20 BROADWAY, NEW YORK

and the Goldschmidt Thermit Co.

103 Richmond St., W., Toronto, Ont.  
1427-1429 Western Ave., Pittsburgh, Pa.

h., East Chicago, Ind.; Jersey City, N. J.





## The Line-up at Mobile of Johnson Metal Tickets for Johnson Fare Boxes

The Mobile Light & Railroad has found the combination of Johnson Metal Tickets and the Johnson (four-cyclometer) Fare Box the best ever for the wide variety of fares to be recorded.

The first cyclometer records cash fares numerically instead of in dollars and cents.

The second records the number of cash tickets.

The third records the number of passes.

The fourth totalizes all fares.



**To Avoid Trouble from Paper Tickets**, the conductor, on receiving a commutation school-book ticket, gives the passenger a slug of the same size as the cash ticket. The passenger drops the slug in the box while the conductor places the ticket in his trip sheet.

### A Double Check Is Secured

by having the conductor ring up on an inside register each fare as deposited in the box. Transfers, which are not deposited in the box, are rung up on the other side of the register.

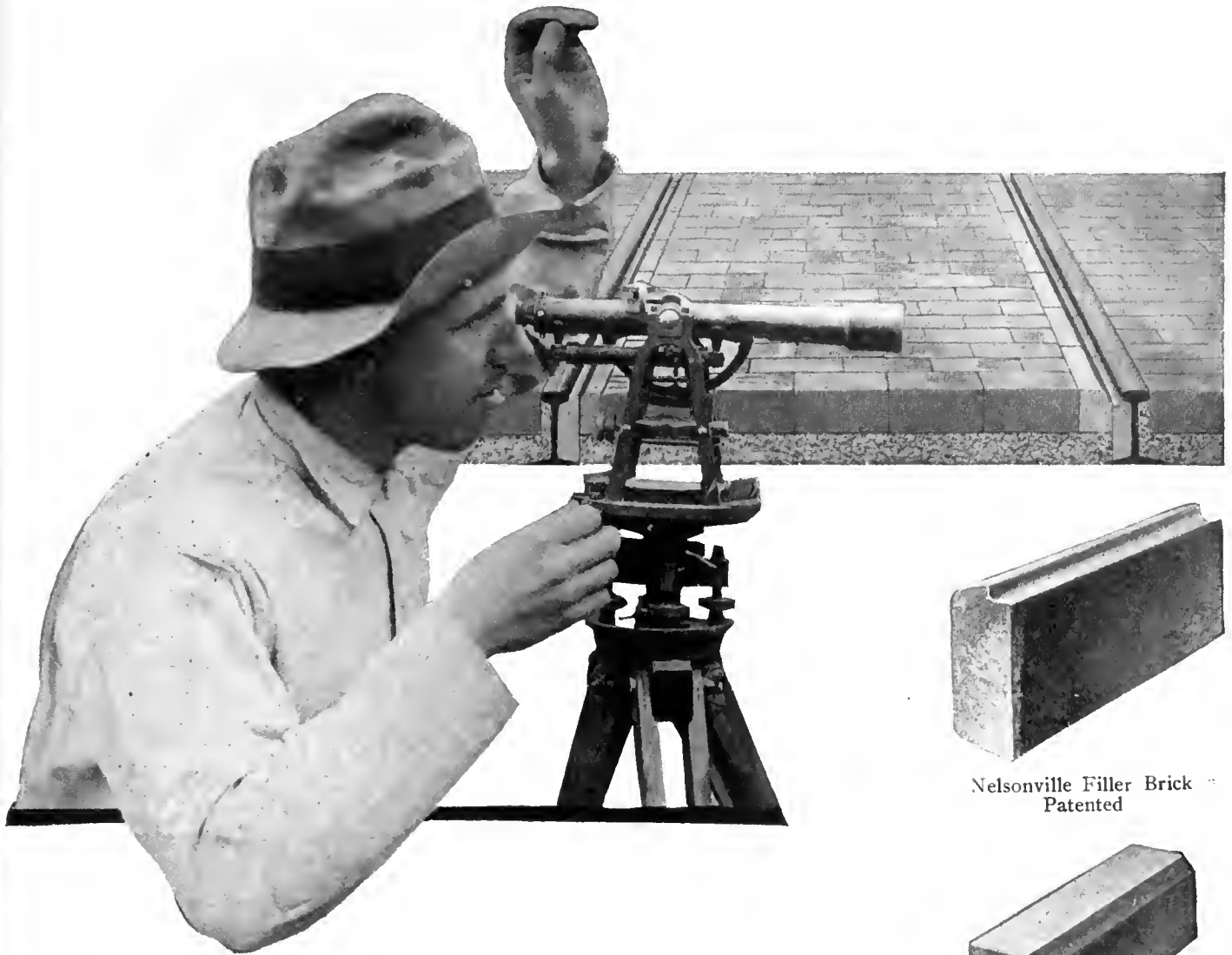
The use of metal tickets has eliminated all illegitimate resale, reuse and substitution. When paper tickets got stuck in the slot, they could be withdrawn and perforations could be smoothed out. Also, transfers were substituted for paper tickets.

To Get All Your Fares Use  
**JOHNSON**  
Fare Boxes — Metal Tickets

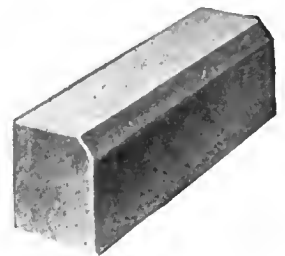
**JOHNSON FARE BOX COMPANY**

Jackson Boulevard and Robey St., Chicago

50 East 42nd Street, New York



Nelsonville Filler Brick  
Patented



Nelsonville Stretcher Brick  
Patented

## The Pavement Will Stay Smooth

Rail Vibration can never affect it if you use

## Nelsonville <sup>Filler and Stretcher</sup> Brick

The joint between the filler brick and the stretcher brick is left ungrouted, making it impossible to transmit rail vibrations.

The brick in the pavement, therefore, will not be displaced as when the old style nose brick is used.

Another big point—Nelsonville Brick

will permit you to use a T-rail in place of the more expensive girder rail. Track costs will be less.

Nelsonville Filler and Stretcher Brick are 9 inches long, and made in shapes to fit any standard type of rail—one fills the same space as three old-style nose bricks.

*Ask us to send you convincing proof of the superiority of Nelsonville Brick for your track.*

*Write for our booklet—"Rail Brick of the Right Sort."*

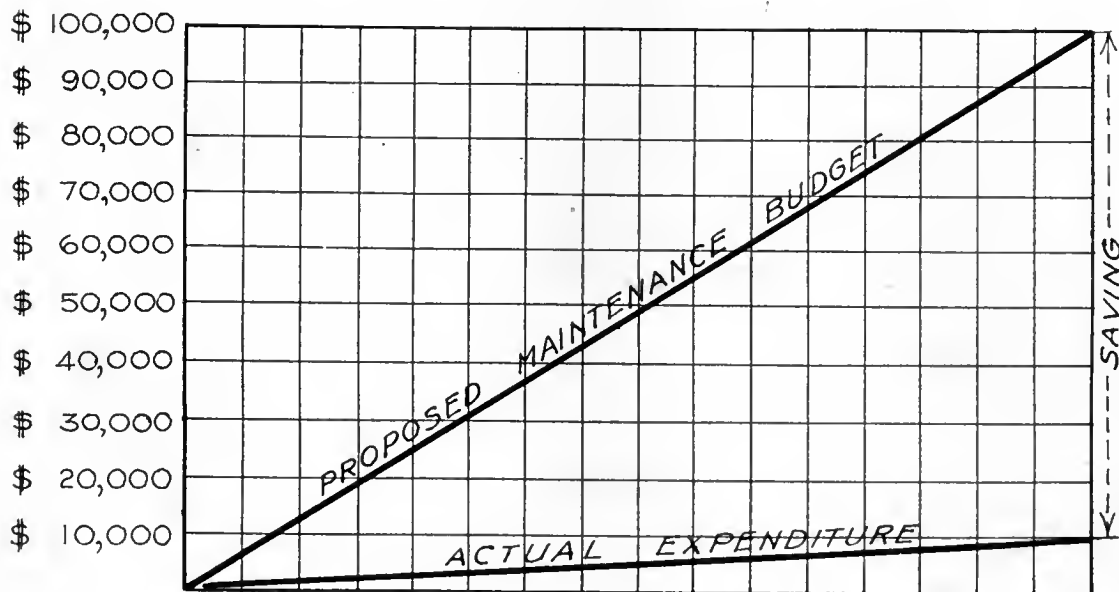
**THE NELSONVILLE BRICK CO.**  
Nelsonville, Ohio

# BUDGET: \$100,000

## *Spent: \$10,000*

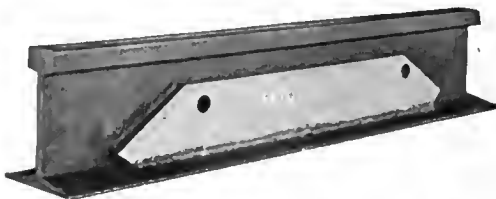
# SAVED: \$90,000

The Management of a Typical Road saw that the rails needed attention. Its budget called for \$100,000



The Engineers expected more. But—  
offered to restore the track to good  
condition with \$10,000 cash and an  
Indianapolis Welder.

The Road saved \$90,000.

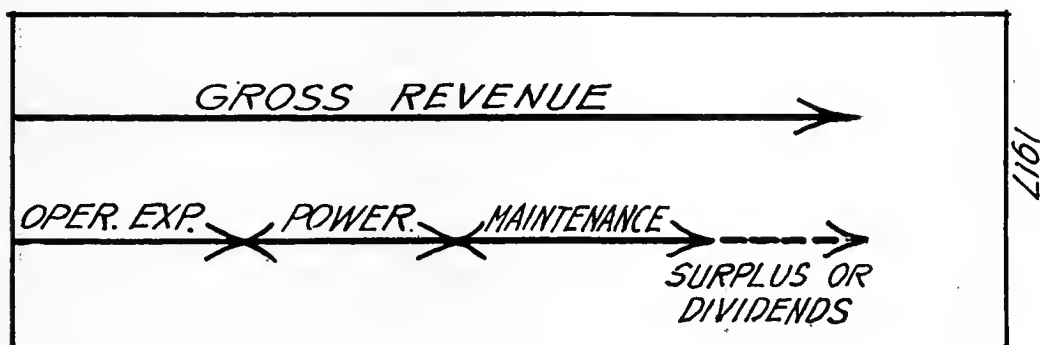
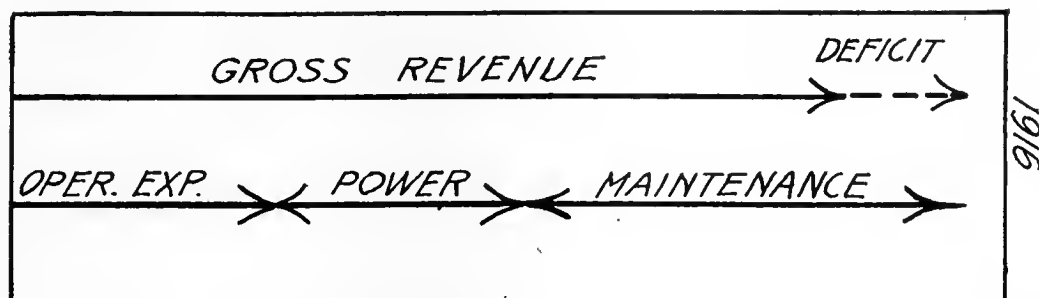


"Simplex" Joint for High Tee Rail

## Indianapolis Switch

Springfie

# How a *Deficit* in 1916 Became a *Surplus* in 1917



In another "Typical Company" a **Deficit** was changed into a **Surplus**, in the face of discouraging odds by careful maintenance provisions, by using an Indianapolis Welder wherever rails showed a tendency to become bad.

At the end of the year, although gross revenues had remained stationary, operating expenses (due to better kept track) and maintenance expenses (with Indianapolis Welder) had been much smaller. The result was a surplus for the company.

**z Frog Company**

io



"Apex" Joint  
for Guard and Girder Rail



# Abbott Rail-Joint Plates

## pay big returns in lengthened track life

**Q**UITE frequently, Abbott Plates are purchased for use on old track, where without such joint support the rails would have to be renewed. The life of old rails has been prolonged in this way for many years and at a cost that made the plates and their installation highly practical.

However, by delaying installation until track gets old some of the best benefits are lost. Rails protected *at the start* by Abbott Plates will permanently retain a perfect joint surface, and the better riding qualities will be accompanied by an appreciable decrease in upkeep attention, in charges for rail, angle bar, bolt and tie renewals.

Abbott Plates are applicable to any type and size of rail section and can be obtained in patterns that conform well to various operation conditions.

*Post yourself further on this subject by getting our booklet "Improved Track Appliances."*

309



### **Lackawanna Steel Company**

LACKAWANNA, N. Y.

ATLANTA	CHICAGO	DETROIT	ST. LOUIS
BOSTON	CINCINNATI	NEW YORK	SAN FRANCISCO
BUFFALO	CLEVELAND	PHILADELPHIA	HAVANA

## When A Machine Is Sold Strictly On Its Merits

to a customer three thousand miles away to be used under local conditions regarding which the maker of the machine has but little knowledge, where there is no opportunity for personal explanation or expert demonstration, and the satisfactory results obtained after continued use can bring forth a letter like this, it is certainly powerful evidence that the machine is "RIGHT."

TELEPHONE NO 58  
TELEGRAPHIC ADDRESS  
"TRAMWAYS DUBLIN"  
All communications  
to be addressed to  
"The Company"  
W. McHUGH  
SECRETARY

*The Dublin United Tramways Company, Ltd.*  
*9 Upper Sackville Street*  
*Dublin*  
13th December, 1917.

Mr. William R. Goodall,  
Secretary & Treasurer,  
Railway Track-Work Company,  
30th & Walnut Streets,  
PHILADELPHIA

Dear Sir,

Referring to your letter of 26th October, I am  
glad to say in reply that the Reciprocating Track Grinder  
supplied by you some time ago continues to give satisfaction.  
We have found that the claims you make for this class of  
Machine are justified in practice

Yours faithfully,



## The Reciprocating Track Grinder

has made that kind of record wherever it has been used. You can demonstrate its value to you on your own tracks without any obligation unless you want to keep it.

**Railway Track-work Company**  
30th and Walnut Streets, Philadelphia

AGENTS: Holden & White, Inc., 343 S. Dearborn St., Chicago  
Wigmore, Hall & Co., Pacific Electric Building, Los Angeles, Cal.



# BETTER TRACKS at Less Cost

## Can Be Laid

by using  
D.M. Ties all  
the way!

Permanent—  
Resilient—  
Economical.



## Are the Result

of careful  
construction.

And the best and  
most careful method  
known so far is that  
of using D.M. Ties.

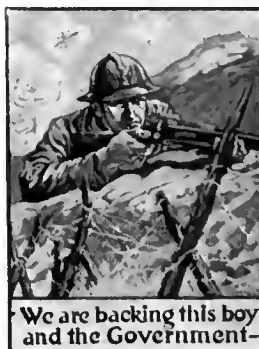
Dayton Mechanical Railway Ties are not only a **theoretical** solution of track troubles. They are the **practical** outcome of years of work and tests on track carrying both city and heavy, high-speed, interurban cars.

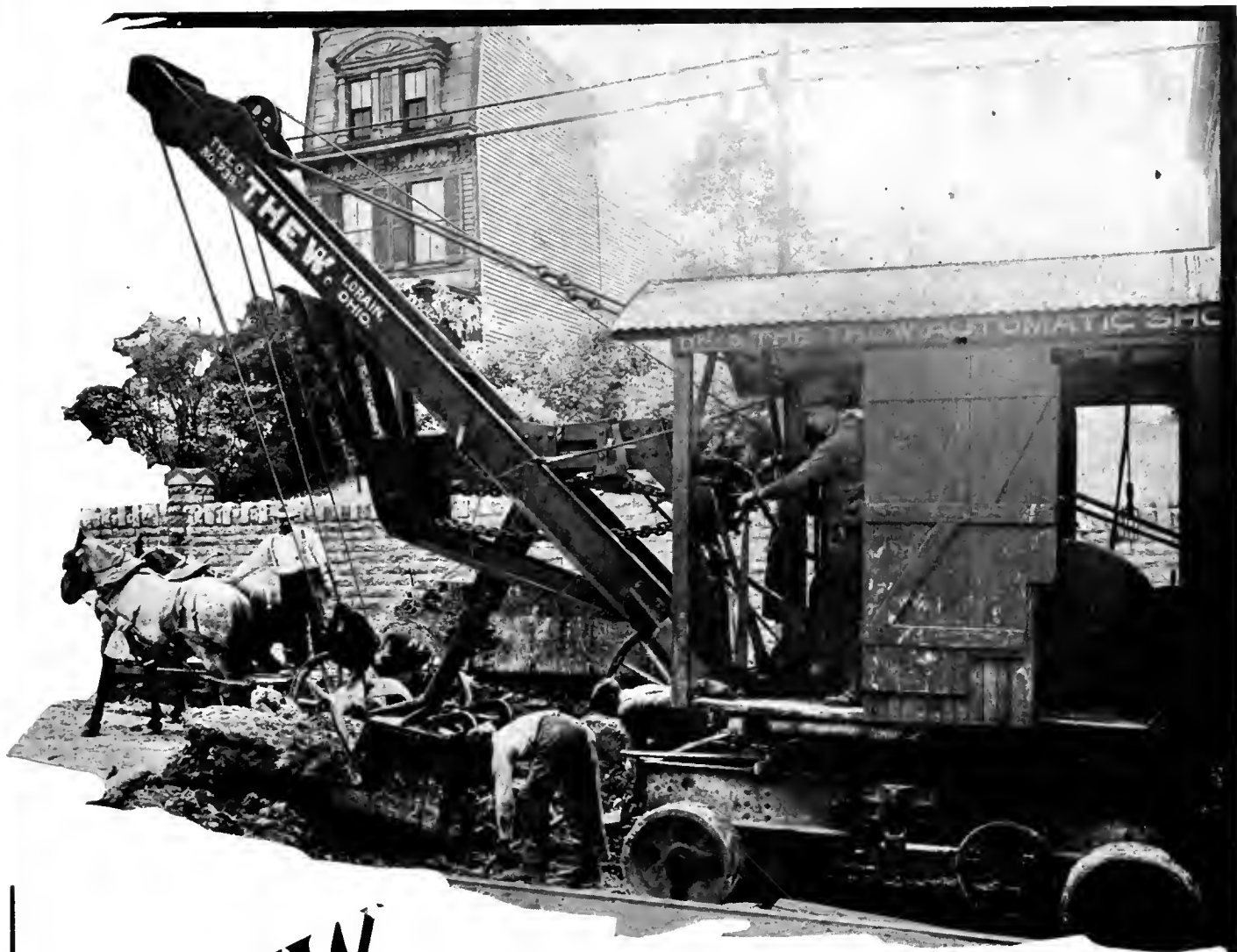
And these  
Ties have  
Made Good  
with a ven-  
geance.

**THE DAYTON MECHANICAL TIE CO.**

201 Third Street Arcade  
DAYTON, OHIO

Write for full  
particulars.





# THEW

*Manufacturers of six  
sizes—sixty combina-  
tions of power shovels*



## The Thew Electric Shovel

This shovel, owned by the Cincinnati Traction Company, Cincinnati, Ohio, not only removed concrete track foundations, but pulled up rails, ties and all, breaking the cast iron bonds between rails. It was a Horizontal Crowd Type O, Electric Thew.

You, of course, know that the Horizontal Crowd motion is adapted to shallow cuts and rugged work.

It's a Thew feature.

It will interest you to know that many Electric Railway Companies are regularly using Thews.

*"Thews are Everywhere."*

## The Thew Automatic Shovel Company

**Lorain, Ohio**

Sales outside of the United States  
ALLIED CONSTRUCTION MACHINERY

**ALLIED**

and Canada handled exclusively by  
CORPORATION, New York, U.S.A.

**New York Office  
30 Church Street**

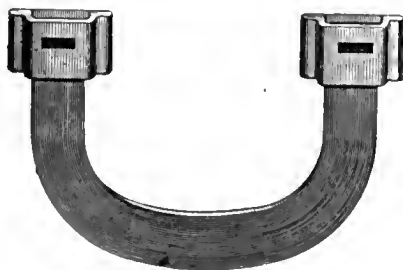
# On the Road The Lincoln Earns Big Profits for the

When the Denver Tramway Co. of Denver, Colo., was confronted by the necessity of installing an emergency rail repair outfit, it selected a Lincoln

Bonding outfit, mounted it on a converted Ford car and sent it on its round of duties. This outfit has proved remarkably efficient; it has been despatched on emergency calls, reaching the spot in record time and completing the repair in less time than it takes the ordinary railwelding outfit to get started.



Because of its instant response to every welding demand this Denver outfit is paying big returns on the investment, and the company characterizes its performance as "very satisfactory."



*A true Integral Weld made in the shortest time  
at minimum cost and without resistance losses*

## The Lincoln

636 Huron Road

### AGENTS:

BOSTON  
Charles N. Wood Co.  
NEW YORK  
Atlantic Welding Co.

PHILADELPHIA  
Railway Track-work Co.  
PITTSBURGH  
Electrical Engineering &  
Manufacturing Co.



# and in the Shop

# Bonder

# Company

Shop welding by means of a Lincoln Bonding Outfit is being recognized as a great help to more efficient maintenance. The ordinary bonding outfit is forced to stay idle during winter weather and the capital sunk in it brings no interest.

The Lincoln Bonder can be used every day of the year and the rate of interest,



The New Brunswick Power & Light Co., St. Johns, N. B., Canada.

or profit, which it bears is directly proportionate to the number of hours it works during the year.

## LINCOLN ECONOMY

### In Men

Labor today is the big problem on Street Railways. Two men can do your bonding rapidly and efficiently.

### In Energy

The machine can be lifted on or off the tracks by two men in less than one minute to allow the cars to pass.

### In Expense

Lincoln bonds are less expensive than other types. Can be welded to the rail in 40 to 50 seconds and will show you a saving of 25 to 35 cents on each bond.

In the ordinary brazing machine the rail is heated all the way through before the bond will stick.

With the Lincoln you can put your hand opposite the weld the instant it is finished—and not burn your fingers! No heat—or current—is wasted!

The Lincoln Bond Welder takes from 8 to 10 kilowatts from the trolley line, and gives an average of 150 amperes welding. Resistance welder takes from 75 to 85 kilowatts to do the same work.

With the resistance type of welder, the electrode in the operator's hand carries full voltage of the trolley line.

# Bonding Company

## Cleveland, Ohio

### AGENTS:

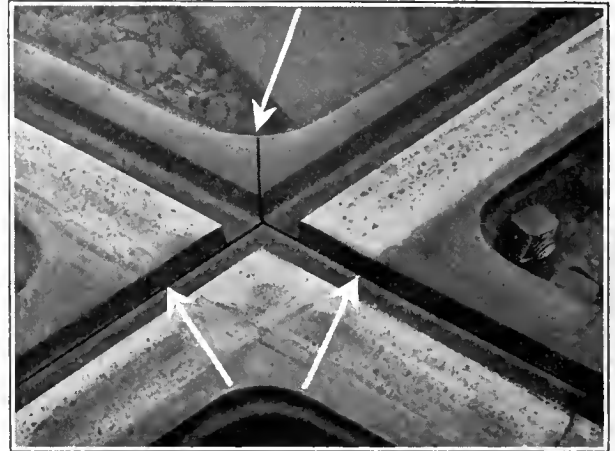
CHICAGO  
Holden & White, Inc.  
ST. LOUIS  
W. L. Rose Equip. Co.

MILWAUKEE  
W. C. Burdick  
LOS ANGELES  
Wigmore, Hall & Co.

MONTREAL—CANADA:  
Lyman Tube & Supply Co., Ltd.



What Happens to a Rolled Rail Crossing



Joints in Balkwill Articulated Cast Manganese Crossings are life savers. They positively prevent breakage at flangeway intersections, permitting 100% wear before renewal

## Why Balkwill Articulated Cast Manganese Crossings Are Superior to Rolled Rail Crossings

This picture at the left shows where breaks in the main steel filling or backbone of rolled rail crossings are usually found.

These breaks are unavoidable because of the lack of flexibility of the rolled steel filler at the flangeway intersection.

In the Balkwill Articulated Cast-Manganese Crossing the difficulty is

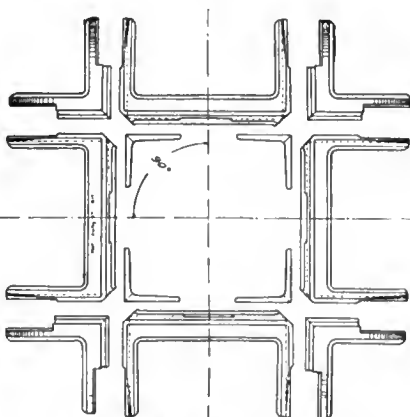
corrected by placing scientifically designed joints at the very places where breakage formerly occurred.

The lower first cost of a rolled rail crossing is therefore not a lower overall cost because it takes several rolled rail crossings to equal the life of one Balkwill Articulated Cast Manganese Crossing. Therefore the Balkwill Crossing is the cheapest in the long run. It gives

### MORE WEAR PER DOLLAR THAN ANY OTHER CROSSING YOU CAN BUY

It saves interruptions to traffic, makes less demand on labor, which is now so scarce, and also reduces the cost of making replacements frequently.

Write us for data on existing installations. If your special work manufacturer cannot get prompt deliveries of manganese castings or has not taken out a license to manufacture these crossings, **DON'T ACCEPT A SUBSTITUTE** but write us direct and we will see that your requirements are taken care of.



Joints at the flangeway intersections of Balkwill Articulated Cast Manganese Crossings positively eliminate breakage

**Order Balkwill Articulated Cast Manganese Crossings  
Direct from Your Special Work Manufacturers**

# **The Balkwill Manganese Crossing Co.**

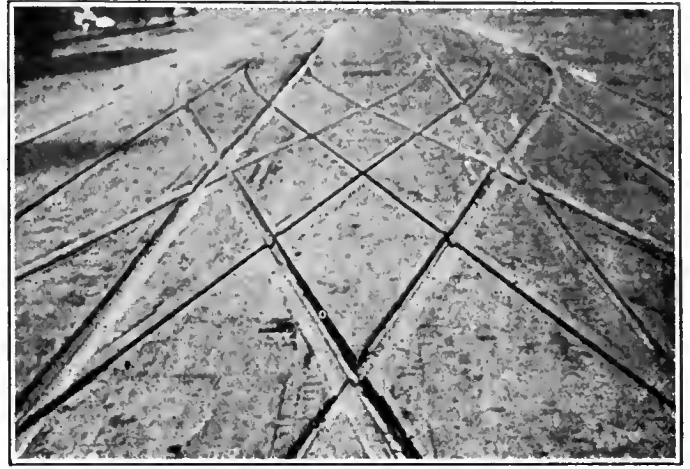
506 Williamson Building, Cleveland, Ohio

# At Cortlandt and West Streets, New York



**BEFORE**

The installation of Alcott Patented Rail Filler and Key Block



**AFTER**

Four Years (February, 1914—March, 1918) of Alcott Patented Rail Filler and Key Block

## New York Railways Company

The special work shown in these photographs is under heavy traffic. The left photograph shows loose special work, while the other photograph shows tight special work and pavement after being under heavy traffic over four years.

Both the old granite block and the old special work were used to produce this remarkable change.

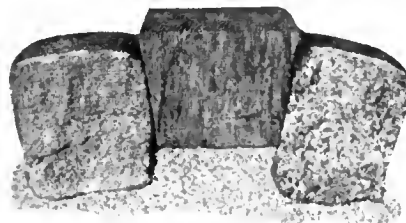
Nothing has been spent for maintenance on this work for the past four years, and I am prepared to guarantee that no maintenance cost worth mentioning will be incurred for a further six years.

The fact of the badly worn ball of the rail resting on the head of the filler, as shown in the photographs below, takes every fraction of wear that is possible out of a rail.

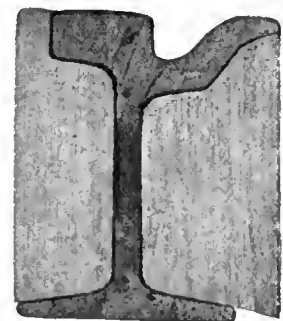


Note how Alcott Rail Filler with the grain of the wood on end supports the badly worn ball of the rail.

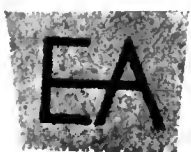
*Write for further facts  
on scores of  
installations*



Alcott Key Block



Filler Block with Profile of New York Railways Co.'s 7 In. Girder Rail



**EDWARD ALCOTT**  
MANASSAS, VA.





# DIXON'S

## The Cost of Fuel, Labor and Maintenance *Can Be Reduced*

The four Dixon Booklets shown above tell you how. Electric railway companies everywhere are profiting by following the suggestions contained in them.

One such company wrote us recently: "The trouble with Dixon's Silica-Graphite Paint is that it *lasts too long for your own good.*"

Dixon's Pioneer Boiler Graphite is reliable for removing scale. Its use results in big economies in fuel, labor and maintenance.

Dixon's Flake Graphite for cylinders cuts the cost of cylinder lubrication squarely in half.

Dixon's Graphite Brushes prevent sparking and wear of the commutators. They automatically lubricate the commutator and give it a dull, glassy polish.

Dixon's Silica-Graphite Paint is ideal for power plants. It is used everywhere about the plant—on drums, boiler fronts, smoke-stacks, and all interior and exterior metal work. For over 50 years it has been the world's standard long service paint.

Write us today for copies of the four booklets illustrated above, Nos. 108-TCMB.

Made in JERSEY CITY, N. J., by the

### Joseph Dixon Crucible Co.



Established 1827



# PRODUCTS



# FORD TRIBLOC



## SAFE!

Conditions often make it necessary for men to work or walk directly underneath heavy loads held in suspension. At such times safety in a chain hoist is imperative.

Safety has always been one of the outstanding features of the Ford Tribloc Chain Hoist. In fact, the Ford Tribloc was born out of the need for safer and longer chain hoist service, and it was born free of the heritage of old patterns or tools "that had to earn their cost."

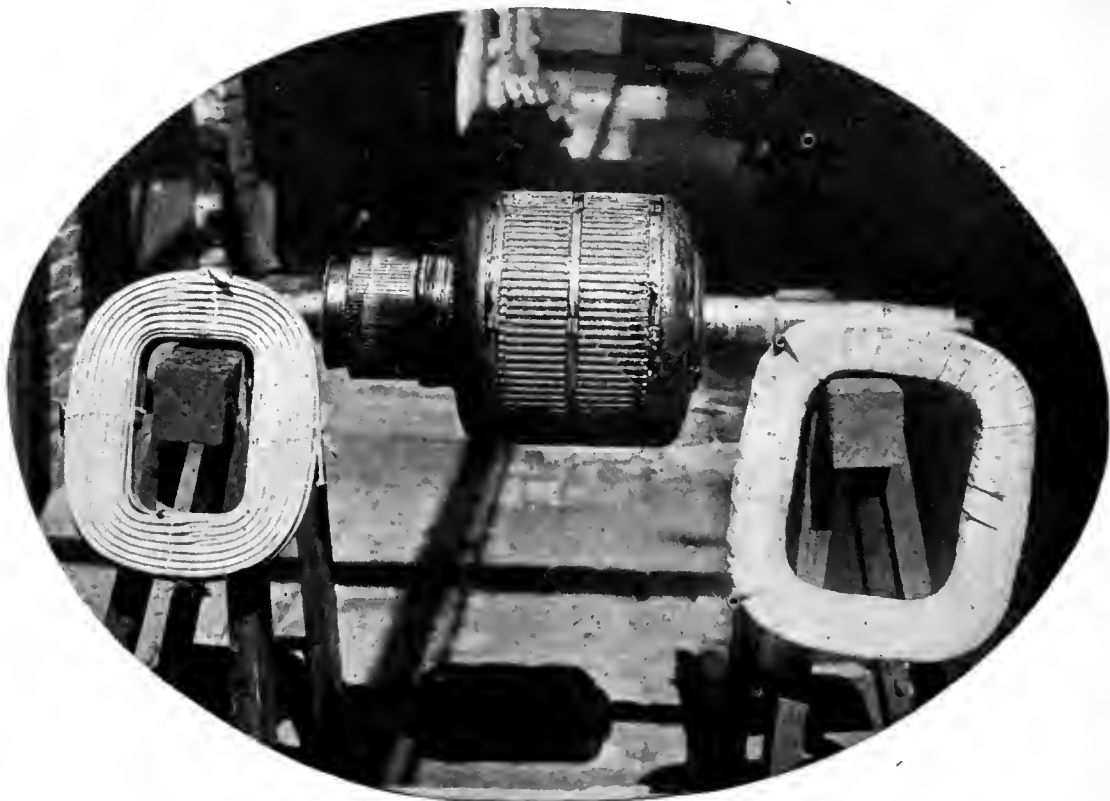
We were free to build a hoist along improved lines—and we did. We insured safety and durability for it by making all working parts of steel. Speed was increased and operating troubles eliminated by endowing it with the LOOP Hand Chain GUIDE that prevents "gagging." Efficiency was assured by using planetary type spur gearing.

A five-year guarantee speaks louder than self-praise. Get the details from Catalog No. 3.

**FORD CHAIN BLOCK & MANUFACTURING CO.**

142 OXFORD STREET  
PHILADELPHIA





# Finish the Job with

# P & B VARNISH

Building up a motor coil is not so different from building up a car. It's not wise to top off the job with a varnish that is unable to withstand hard usage.

But being wise, many railways take ample care that the wire, the duck and the tape that make up a coil are properly protected with

## P & B Varnish

—the first line of defense against interruption to service.

The P & B Line includes tape for line and power service; air-drying varnishes; baking varnishes; oil-proof finishing varnishes; preservative paints; cement floor coatings.

Yes, there's a booklet on each of the P & B specialties.

## The Standard Paint Company

New York

Chicago

Boston

It earns dividends—

## *The* BEAUMONT SKIP HOIST

The right way with ashes

An automatic Beaumont Skip Hoist of the type shown in the lower right hand illustration saves the Eastern Pennsylvania Railways

**\$12 per day**

or more than

**\$4000 per year**

We design, furnish and erect complete installations, including bunkers, structures, and concrete, under one contract.

Catalog 34 gives valuable data on Skip Hoists and on modern boiler house design. Catalog 33 shows some of our coal and ash handling installations.

### R. H. BEAUMONT CO.

111 So. 5th St., Philadelphia, Pa.

New York: 50 Church St.

Boston: 141 Milk St.

*Specialists for 25 years in complete equipment for handling coal, ashes and coke in boiler and gas houses.*

*Beaumont*  
ONE CONTRACT  
ONE RESPONSIBILITY

**Left view:**

Full automatic Beaumont Skip Hoist used by Boston Consolidated Gas Co. Unloads coke car without attention after starting.

**Right view:**

Beaumont Skip Hoist for ashes, used by American Railways Co., Roanoke, Va.





# Insulate with



Diamond-F Fibre is a dense, horn-hard material of unique texture, designed to supplant wood, iron, brass, steel, tin, hard rubber, leather, mica, porcelain, glass and many other scarce and costly materials used in the electric railway and other industries.

Diamond-F Fibre is furnished in three primal shapes—sheets, rods and tubes—as well as in numerous special forms. Diamond-F Fibre can be sawed, bent, bored, tapped, turned, threaded, milled, punched, stamped, embossed, and worked into almost any conceivable form. It has passed severest electrical tests with high averages.

A vital feature of Diamond-F Fibre is that it is comparatively free from dust, grit, metal or other foreign substance. Its dielectric strength is consequently greater and it can be machined with more speed and less wear on tools and cutters.

Diamond-F gears, worms, pinions and sprockets are true to pitch and pitch-line. Meshed with other gears of metal, they silence the whole gear-train and prolong its life.

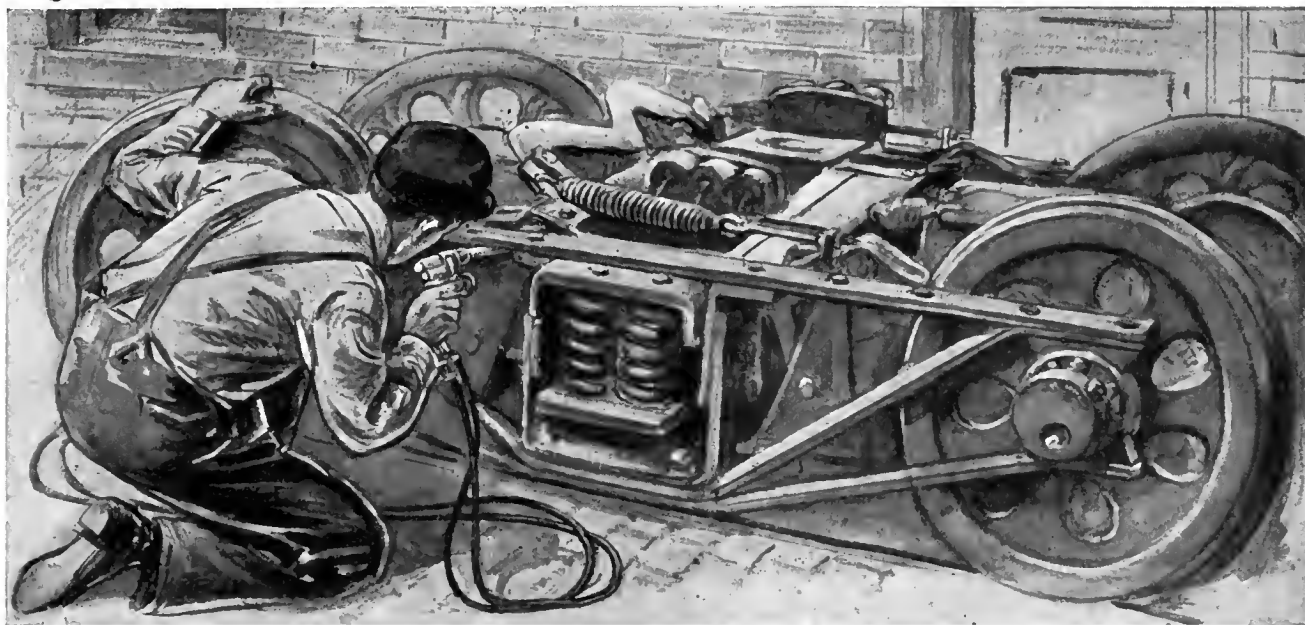
Perhaps right now you are using some material that Diamond-F Fibre would replace at less cost and with better results. Our engineers will be glad to collaborate with yours. Tell us your problems.

*Important—Our New York and Chicago stocks of Diamond-F Fibre in sheets, rods and tubes will take care of the largest metropolitan orders in record time, a vital factor in view of the present freight-congestion. In addition, the Chicago factory has machinery for producing fibre specialties.*

**Diamond State Fibre Company**  
**Bridgeport, Pa.**  
(Near Philadelphia)

*Makers of Disfeco Horn Fibre and Diamond-F Protective Papers*





# Spraco Paint Guns

Save Man Power in the Shop of

The Steubenville, East Liverpool &  
Beaver Valley Traction Co.

With a brush it used to take three to four hours for a man to paint the trucks of a double-truck car.

With a Spraco Paint Gun he does the same job in half an hour.

**Preserves Underframes  
of Light Weight Steel Cars**

The Spraco Paint Gun is also used to protect the underframes of this Company's light-weight steel cars against rust. After the entire bottom of the car is scoured with wire brushes, scrapers and compressed air

blast, the "Spraco" sprays the pressed shapes and sheets with a mixture of red lead and oil. Not only does the Spraco Gun save time at 35 cents an hour, but

**Spraco Gun Paints Recesses  
and Joints Almost Inaccess-  
ible by Hand**

There's hardly a painting job that the Spraco Paint Gun won't do better and quicker than the hand-

operated brush from insulating a motor interior to preserving the steelwork of a car.

**SAVE LABOR  
and  
Help Win the War**

**SPRACO  
Equipment Will Do It**

## SPRAY ENGINEERING COMPANY

ENGINEERS for

Spray Cooling Ponds, Irrigation Systems,  
Air Conditioning, Aerating Reservoirs,  
Odor Condensers, Gas Washing, Installa-  
tions.

93 FEDERAL STREET  
BOSTON, MASS.

Manufacturers of

Air Washers for Steam Turbine Gener-  
ators, Spray Nozzles and Spray Pond  
Equipments, Paint Spraying Apparatus  
for Bodies, Trucks and Fenders, Humid-  
ifiers, Asphalt, Nozzles, Gas Washers,  
Park Sprinklers, Aerating Nozzles.



# The Capital Traction Company Uses EMPIRE CLOTH From Power Plant to Track Switch

The adaptability of Empire Cloth to electric railway needs is well demonstrated in the practice of the Capital Traction Company, Washington.

Empire Cloth is used for taping the pot-head leads of 6600-volt lead-covered cables.

Empire Cloth is used for all field coil rewinding as a matter of course—and

Empire Cloth is used in rewinding the solenoid coils of automatic track switches—an extremely severe test for the moisture-resistant quality of Empire Cloth.

## EMPIRE CLOTH

is a registered trademark product manufactured exclusively by us.

### EMPIRE

Linseed oil treated Cambric, Linen, Silk, Canvas, Duck and Papers. High puncture voltage, long life.

### KABLAK

Black Varnished Cambric, Linen, Silk, Canvas, Duck and Papers, Flexible, efficient under high temperature.

### MICANITE

Commutator, Insulators, Tubes, Washers, Rings, Segments, Sheets, Tapes, etc., made of imported mica.

## Insulation For Severe Service

SEND FOR BULLETINS

### LINOTAPE

Linseed oil coated tape, both straight and bias cut for coil winding, cable splicing, bus bars, etc.

### MICO

Untreated insulating fabrics, Papers, Fibres, Linen Tapes, Sleeves, Shellacs, Cements and Varnishes.

## MICA INSULATOR COMPANY

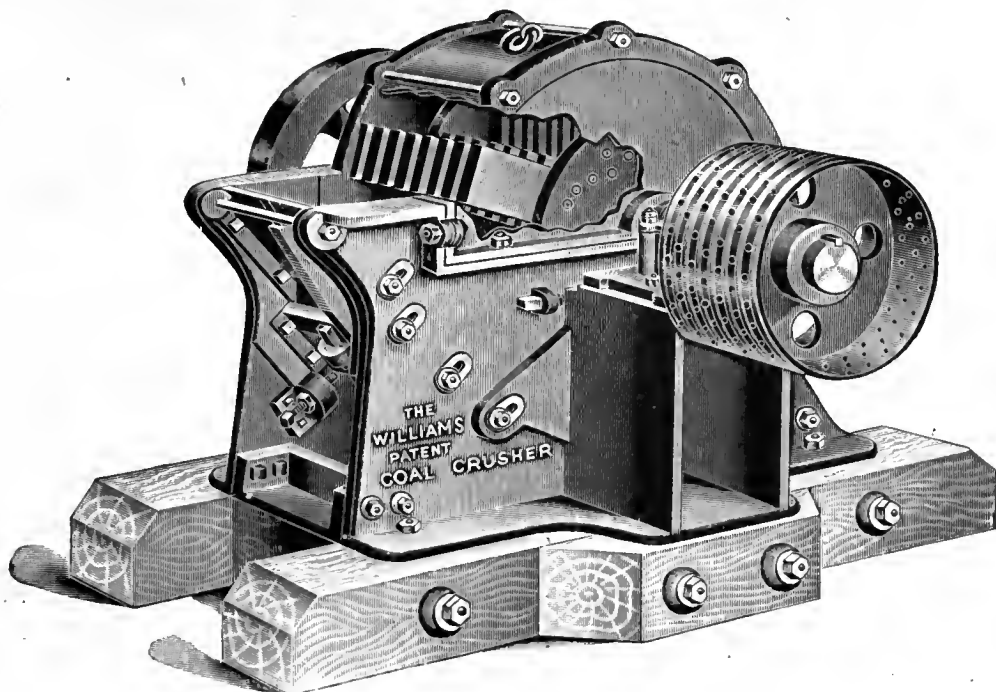
NEW YORK

68 CHURCH ST., COR. VESEY ST.

CHICAGO

542 SOUTH DEARBORN ST.





## WILLIAMS COAL CRUSHERS

It is a well-known fact that Automatic Stokers and Chain Grates give the best results when supplied with coal ranging from  $1\frac{1}{2}$  in. down to  $\frac{3}{4}$  in. with the minimum of fines or degradation. However, as was experienced last winter, these sizes are difficult to obtain from the mines; Run of Mine and Lump Coal being the order rather than the exception. This makes it necessary for owners of Stokers or Chain Grates to crush their own coal. Crushing their own run of mine or lump coal is the only insurance against shortage in stoker sizes.

For this work the Williams Coal Crushers are unexcelled. Hundreds of Williams Crushers are doing this work every day, crushing thousands of tons of run of mine and lump coal to stoker sizes. For this class of work Williams Crushers are equipped so that the resulting product will be free from fines or degradation as far as it is possible to control degradation. Recent installations of Williams Crushers for this purpose have been made in the following plants:—

Union Electric Light & Power Co., St. Louis, Mo.  
 United Railway Co., St. Louis, Mo.  
 St. Joseph Electric Light & Power Co., St. Joseph, Mo.  
 Detroit-Edison Co. Detroit, Mich.  
 Ford Motor Co., Detroit, Mich.  
 Municipal Electric Light Works, Owensboro, Ky.

Rochester Light, Heat & Power Co., Rochester, N. Y.  
 Washtenaw Gas Co., Ann Arbor, Mich.  
 A. E. Staley Mfg. Co., Decatur, Ill.  
 Standard Oil Co., Whiting, Ind.  
 Aluminum Ore Co., East St. Louis, Ill.  
 Mark Mfg. Co., Zanesville, O.

Paramount reasons why Williams Crushers should be used for this work are, that Williams Crushers are adaptable to all conditions; they are also adjustable to most every size of crushing, one machine being often used for crushing anywhere from 3 in. to  $\frac{3}{8}$  in. at the will of the operator. In addition they are accessible, making renewal of parts or inspection of internal mechanism easy. They are also provided with a metal trap which gathers in a pocket all stray pieces of iron, thus preventing damage to the crusher, a feature not found in any other crusher. Further, Williams Crushers are reliable, as has been demonstrated during the last 22 years, the first Williams Crusher installed being still in active service. Complete information, such as description, specifications, illustrations, etc., will be found in Bulletin No. 90.

**THE WILLIAMS PATENT CRUSHER & PULVERIZER CO.**

GENERAL SALES DEPT., 37 W. VAN BUREN ST.

PLANT  
ST. LOUIS

CHICAGO

67 SECOND STREET  
SAN FRANCISCO

# The Automatic Reclosing Circuit Breaker

## Eliminates Substation Labor Cost

It also saves copper

It gives better power distribution and

It reduces service interruptions

Analyze these benefits and determine for yourself what a tremendous saving it will mean to you when you equip your sub-stations with this human, sensitive, always watchful automatic reclosing circuit breaker. Aside from the important economies in construction and operation which it effects

### *It absolutely protects*

the generators from overloads and short circuits, yet never keeping the current off a moment longer than necessary.

The Automatic Reclosing Circuit Breaker can be used in connection with any type of D. C. sub-station. Its operation is positive. Through its use the labor cost for sub-station attendants' services are eliminated and great economy in sub-station operation is thus secured.

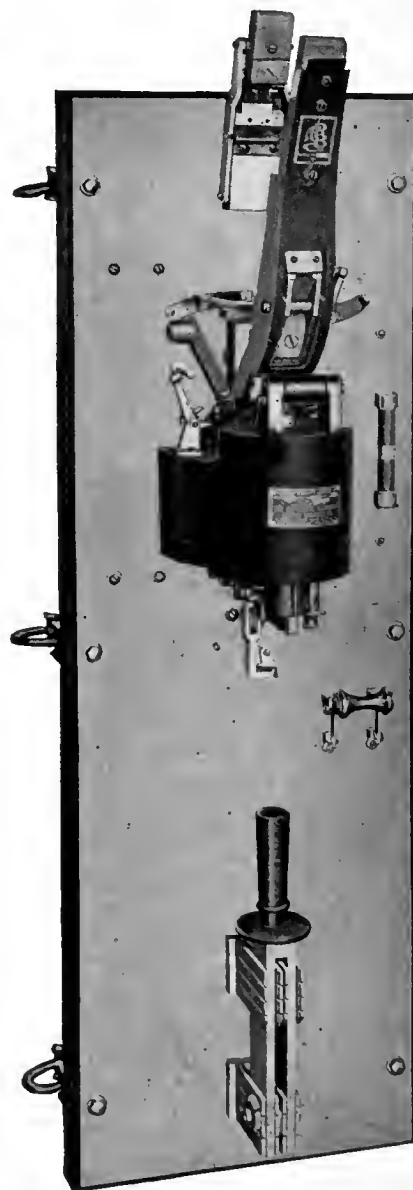
This device has been in general use for many years. Its reliability in street railway work has been demonstrated and many sub-station installations are now being made.

The Automatic Reclosing Circuit Breaker is an essential part of any switchboard equipment for direct current sub-stations.

May we show you how it will save much money at small cost? Write for Bulletin No. 30, "Theory and Application."

**The Automatic Reclosing  
Circuit Breaker Co.**

**Columbus, Ohio**



Automatic Reclosing Circuit Breaker mounted on feeder panel with disconnecting switch.

#### Operation

The Automatic Reclosing Circuit Breaker is an electromagnetically operated circuit breaker having the following operating characteristics:

- (a) Breaker is closed by means of an electromagnet.
- (b) Opens automatically in case of overload or short circuit.
- (c) Remains open a definite time interval regardless of cause of opening.
- (d) In case breaker is opened by a short circuit, the breaker makes no attempt to reclose while the short circuit exists, but closes instantly upon the removal of short circuit or overload.

# Painting Cars In War Times



Trade Mark Registered

## The Ce Ve Process

of car painting is a system whereby much less time, labor and material is used in painting a car. A steel car formerly requiring 12 to 18 days to go through the shop is now put through in five to six days. A wood car formerly requiring 14 to 22 days to go through the paint shop goes through the complete Ce Ve process in six to seven days. The system gives a more durable job than any of the old, slower painting methods.

## The Enamelite Ce Ve System

embodies the Ce Ve Process undercoats, and a double coating of Ce Ve Enamelite enamel. This enamel is a specially prepared body finishing enamel which is equally effective on wood or steel cars. It is quick-drying, durable and gives a finish which is unexcelled.

These days of shortage have forced many economies in every line of industry. The saving of labor and material costs is a patriotic necessity.

To bring about greater economies in car painting without reducing the durability, we now offer to the trade the

## Enamelite Ce Ve System for Wood and Steel Car Painting

More than 10 years ago we revolutionized car painting by placing on the market the Ce Ve process for painting steel and wood cars. Through its use the non-earning period of cars sent to the paint shop is reduced by one-half, and marked savings are effected over the other systems of car painting.

The Enamelite Ce Ve System of car painting embodies the substantial undercoating of the Ce Ve process, and a double coating of Ce Ve Enamelite enamel without sacrificing the quick drying feature. It affords all the unexcelled qualities of the Ce Ve process at a substantial reduction in labor and material costs over that economical process. It is a real war time painting system.

Equally efficient on wood or steel.

*Write for booklet "Painting Cars In War Times"*

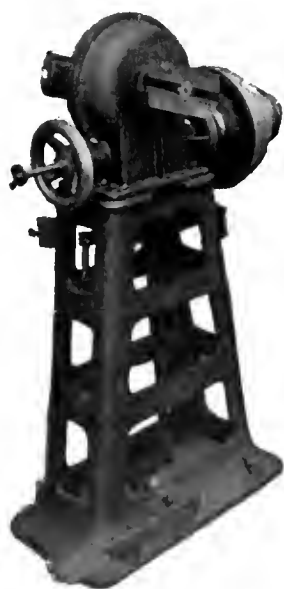
# Chicago Varnish Co., Chicago, Ill.



# Columbia

## A Coil Taping Machine that Tapes TIGHT and RIGHT

The Columbia Coil Taping Machine successfully combines *tight* and *swift* taping. A coil properly taped not only gives the best service but it needs less tape. And quick taping means lower labor costs and more time saved in the shop. What more can we say but that *we use these machines on our own coils?*



Winding Machine for  
Armature and Field Coils

## Coil Winding Machines that speed up Coil Production

Columbia Coil Winders make up for the deficiency of their operators—or enable good men to do even *better* work in minimum time and at least expense. They speed up winding to the utmost. Characteristically COLUMBIAN in their all-round quality. A Bulletin (on request) gives you detailed reasons why. Get your copy.

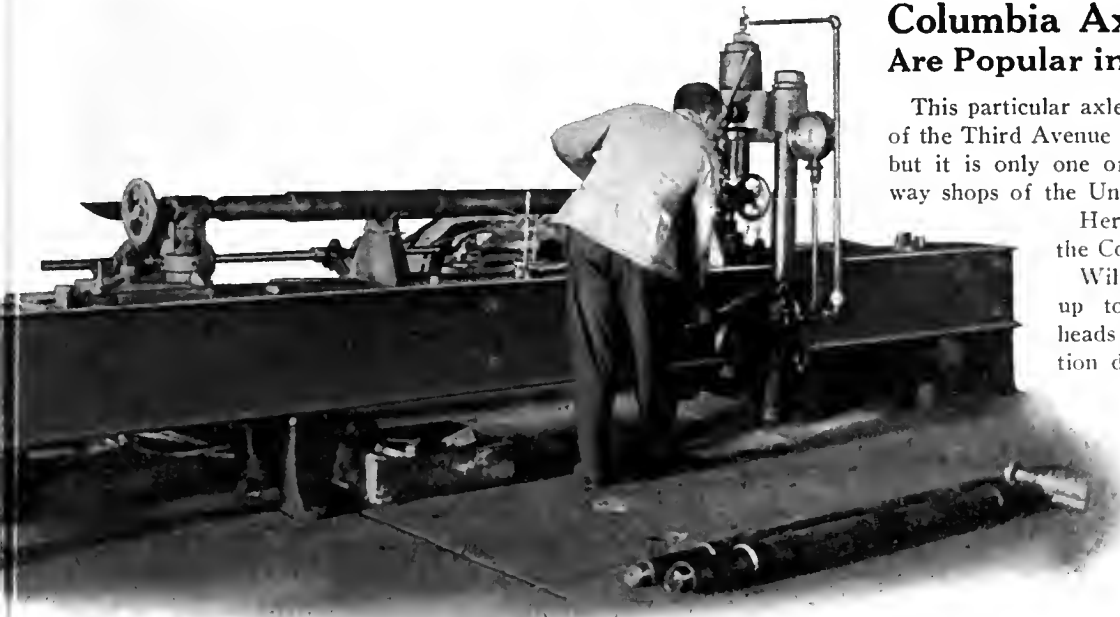


## Columbia Machine Works

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

Axle and Armature Straighteners, Bearings for Armatures and Axles, Armature Stands, Armature Buggies, Car Hoists, Car Replacers, Brake Appliances, Handles, Forgings for Rigging, etc., Babbiting Molds, Lathe Chucks, Banding and Heading Machines, Coil Winding Machines for Field and Armature Coils, Coils for Armatures and Fields, Coil Taping Machines for Armature Leads, Car Trimmings, Car Signs (Day and Night), Commutators, Controller-Handles, Door Locks, Gear Cases (All Steel and M.I.), Pit Jacks, Grid Resistors, Signal or Target Switches, Pinion Pullers, Trolley Poles (Steel), Trolley Wheels, Tension Stands, N. W. Cartridge Fuses, Track, Special Work.

# EQUIPMENT and SPECIALTIES



## Columbia Axle Straighteners Are Popular in Shops of All Sizes

This particular axle straightener is in the shops of the Third Avenue Railway System, New York, but it is only one of many in the electric railway shops of the United States and elsewhere.

Here are the main facts about the Columbia axle-straightener:

Will straighten axles and shafts up to 6" diameter; the center heads remain in the same position during the entire straightening process; and inside spring in the center heads takes up the pressure at the ends of the shaft, avoiding the removal of the center points from the axle centers when straightening; operation is by means of hydraulic pressure.

Columbia Axle Straightener in the Shop of the Third Ave. Railway System, New York

## These famous Columbia Electric Hoists

contribute to repair shop economy in time and labor, because they are so designed that they will elevate a 50-ton car 6 feet in five minutes; and lifting at this rate is carried out with no jacking whatever. Any old traction motor will run them.



# Malleable Iron Co.

W. R. Kerschner Co., Inc., N. Y.  
Holden & White, Inc., Chicago

F. F. Bodler, San Francisco  
Railway & Power Eng. Corp., Ltd., Toronto, Can.

Send for the Columbia Bulletins





# Columbia

## Trolley Poles backed by *HAIR- TRIGGER SHIPMENT*



Metal is scarce—getting scarcer. But Columbia Trolley Poles are NOT scarce. We foresaw the situation and forestalled it. A typical example of Columbia many-angled service. Columbia Trolley Poles are the dependable product of a concern which, to use the little girl's expression, "concentrates on a lot of things." Columbia Poles are made to resist the stresses and thrusts of service—to last long and satisfactorily—to be the lowest of all your "overhead expenses."

## Bearings with the inside "Smooth as Glass"

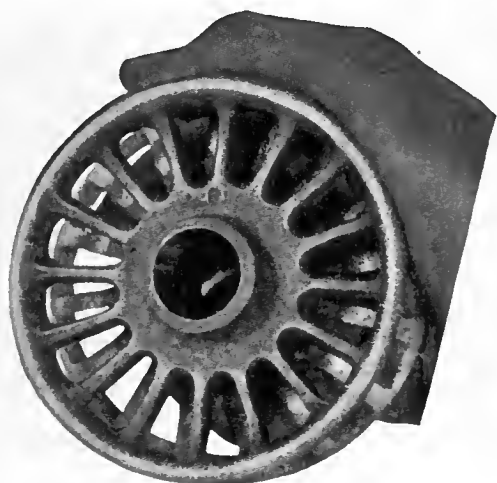
Not just metal poured into a mold. They embody the *right formula*. They are insurance of a mixture of just the *right temperature* so that the metals will really mingle. They're glass-like at the finish—because we give them a glass-like finish to begin with. Makes no difference to us whether they're bronze or iron—the same care goes into all of them. Bearing-making is not the least important of Columbia activities.

# Columbia Machine Works

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

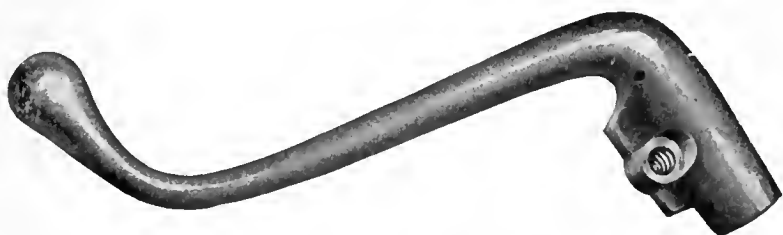
Axle and Armature Straighteners, Bearings for Armatures and Axles, Armature Stands, Armature Buggies, Car Hoists, Car Replacers, Brake Appliances, Handles, Forgings for Rigging, etc., Babbitting Molds, Lathe Chucks, Banding and Heading Machines, Coil Winding Machines for Field and Armature Coils, Coils for Armatures and Fields, Coil Taping Machines for Armature Leads, Car Trimmings, Car Signs (Day and Night), Commutators, Controller-Handles, Door Locks, Gear Cases (All Steel and M.I.), Pit Jacks, Grid Resistors, Signal or Target Switches, Pinion Pullers, Trolley Poles (Steel), Trolley Wheels, Tension Stands, N. W. Cartridge Fuses, Track, Special Work.

# EQUIPMENT and SPECIALTIES



## Trolley Wheels for All Conditions

We make sleet-cutting wheels that cut sleet without auxiliary sleet cutters. Columbia Trolley Wheels—standard and special—4, 5 and 6 inch diameters—ready for immediate shipment.



## Gear Cases that Stand the Racket

Sheet steel. Malleable iron. Prevent fracture at the suspension points and trouble from dust and mud. All our experience along these lines (and it is quite considerable) has gone to make these Gear Cases trustworthy.



## Controller Handles

Over 20,000 Brake Handles in service for the past ten years. We guarantee them for three years. When the Brake is applied the Pawl cannot burst through—a mighty good little point to remember.

## The Forging of a Brake Lever

We manufacture thousands of brake levers for the most intensive electric railway service in the world; pretty clear proof that we have the facilities to make such an important product right and at a fair price.



# & Malleable Iron Co.

W. R. Kerschner Co., Inc., N. Y.  
Holden & White, Inc., Chicago.

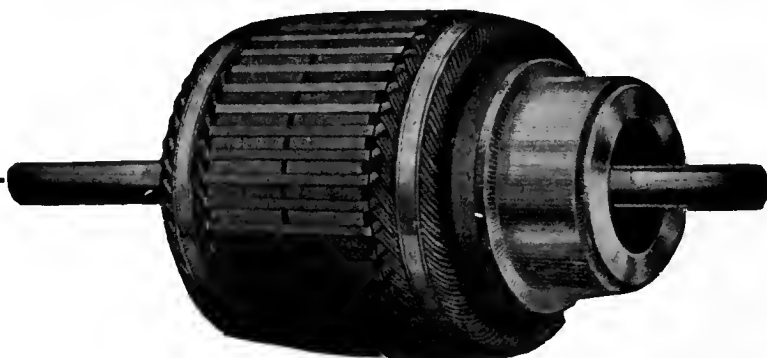
F. F. Bodler, San Francisco  
Railway & Power Eng. Corp., Ltd., Toronto, Can.

Send for the Columbia Bulletins

# CAMERON

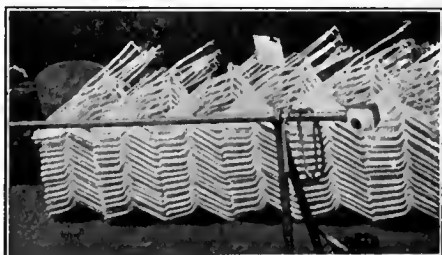
## Armature Parts

Quick  
Repairs



Money  
Savers

### Cameron Coils

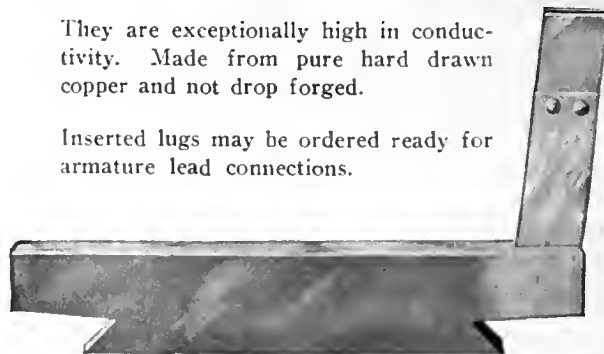


Made from the best quality material by skilled winders. High in conductivity and carefully insulated to safely stand up under the highest service temperature. Prompt attention given to all requirements.

### Cameron Bars

They are exceptionally high in conductivity. Made from pure hard drawn copper and not drop forged.

Inserted lugs may be ordered ready for armature lead connections.



### [Cameron Commutators



The exceptionally sturdy design is the result of many years of specialization in better commutator building. After assembling they are made absolutely tight by hydraulic pressure. Guaranteed to be true to gauge and free from defects. No trouble from loose bars.

### Cameron Mica

Consists of the unequalled "Canadian Amber" which insures a soft, uniform wear. Easily turned down in truing.

Let us help you save time, money and labor on all motor and generator repair parts.

Let us explain in full why it pays to use Cameron Products.

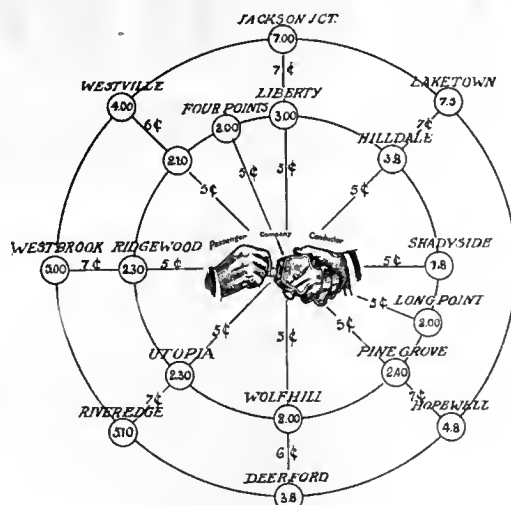
*Write for Catalog and Prices.*



**We are backing this boy and the Government—**

## Cameron Electrical Mfg. Co., Inc.

Ansonia, Connecticut, U. S. A.



# The Rooke Is Right

## for Straight Fares to Zone Fares

### *You May Use Fare Boxes—But What About*

- the 6 cent or 7 cent fare.
- the penny-zone fare.
- the front end street collection, to speed up the movement of prepayment cars in crowded city centers.
- the collection of fares on trailer cars, zone-collecting cars, old-style open cars and miscellaneous other cars not equipped with the fare box.

**I**T may be that you are not meeting these fare-collecting contingencies to the best advantage.

You may operate fare-boxes—but not on all cars. Are you satisfied with near-efficiency? Do you wish to make the collecting principle adopted for fare box collections *consistent* on all cars not equipped with boxes? Surely you wish to secure and apply at all times that valuable thing called *passenger-cooperation*—the thing which eliminates *optional* registration.

Instead of *cheapening* your prepayment collecting method and *confusing* instead of *habituating* passengers in modern methods of fare payment *always* on *all* cars, you may still be inviting losses.

The ROOKE register is sometimes called "the little fare-box." The *idea* back of that

colloquialism should be suggestive to you. One manager operating boxes on a portion of his cars recently installed ROOKE registers on the remainder, including zone lines, where fare boxes could not be used. This card to passengers both *explained* and *justified* the move.

### **Notice to Passengers**

#### WHAT'S THE IDEA?

This small portable fare-box is conveniently brought to the passenger on cars where the larger stationary box is not used. A more flexible adaptation of the same collecting principle—that's all.

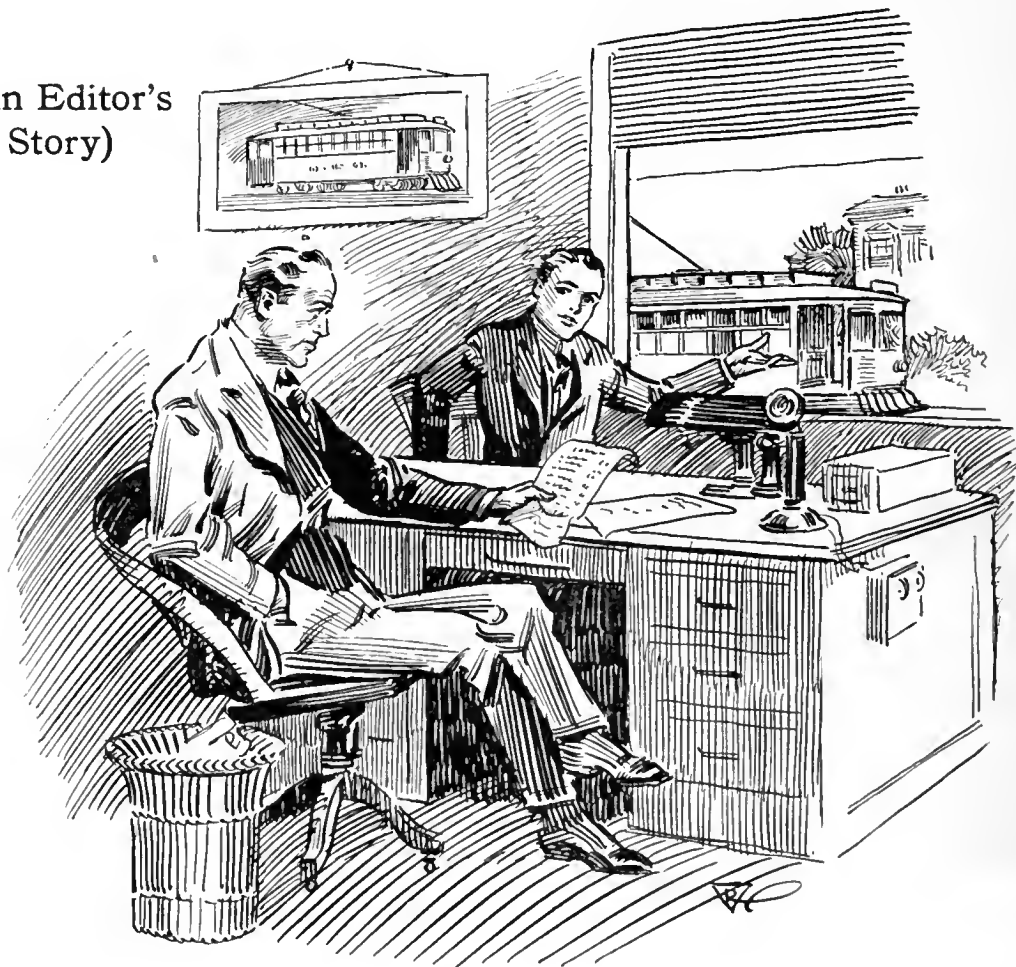
And then there is the penny-zone fare looming up as a collecting contingency in many cities. The ROOKE register is "pat" for that. WRITE US.

## ROOKE AUTOMATIC REGISTER COMPANY

Providence, R. I.

# Why the People Didn't Ride

(An Editor's  
Story)



One day I called upon a disconsolate Railway Manager in a town that shall be Nameless.

The Jitney Flood had subsided almost everywhere else, but it was still Going Strong here.

As the Manager spread out the car service statement before him, he said:

"I can't understand it. We never gave so much Service before, and never got so little

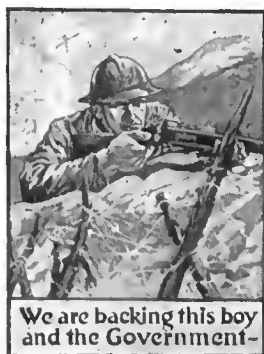
Travel. Who would have thought that the Public would stick to the Jitney?"

As I looked out of the Manager's window at the procession of Spruce-Looking but Half-Empty Cars, I wondered, too.

Then it suddenly occurred to me to visit the company's shops.

The manager courteously offered his own Limousine. We declined, saying jokingly:

A Street Car Ride may show what's wrong!

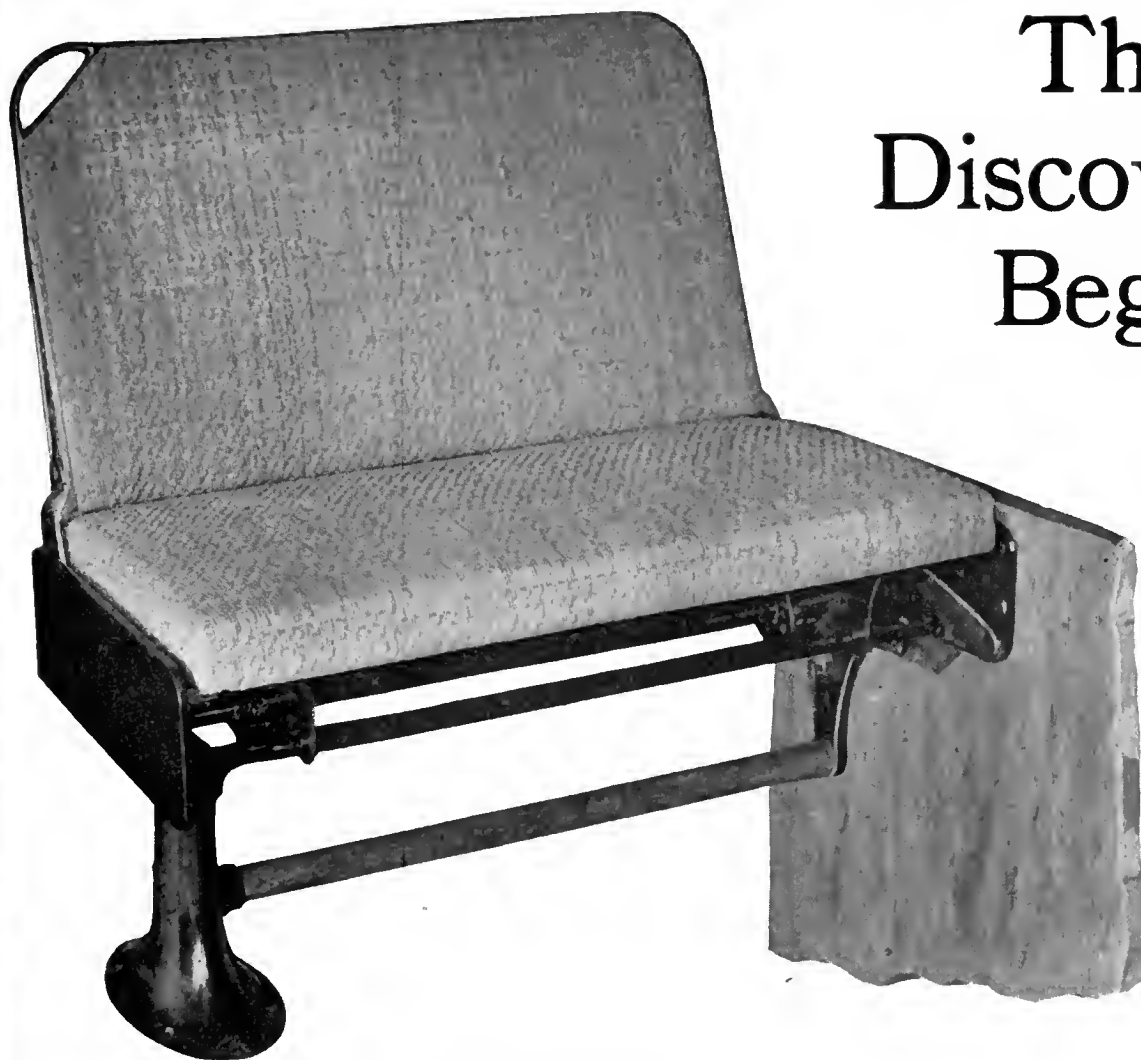


## Hale & Kilbur

Philadelphia  
Washington

New York  
Atlanta





Hale & Kilburn No. 400  
The Last Word in City Car Seating

## Then Discoveries Began

The first thing noticed was that the steps were so high that few Women could board the car without Aid—therefore many of them used Jitneys.

And the second thing was that it didn't improve the ladies' Tempers when the conductor ordered them to step lively.

But the third and most serious thing was the

### Out-of-Date Seats

They were spaced too closely for good Knee-room, the shaping of cushion and back did not permit a Comfortable Posture and

The end fixtures and pedestals were so Wasteful of space that two passengers could not share a cross seat in harmony owing to lack of seat room.

After a Spine-Racking ride the shops were reached—and there the seat Mystery was solved.

From motives of false Economy the company had been patching up seats after models of a Past Generation.

Since that day I have been a firm believer in the

### HALE & KILBURN DOCTRINE

*That good seating attracts riders and bad seating repels them.*

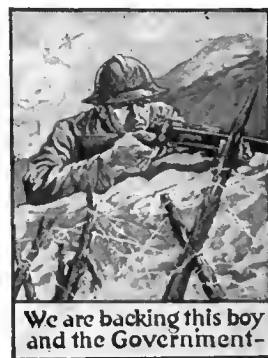
# Corporation

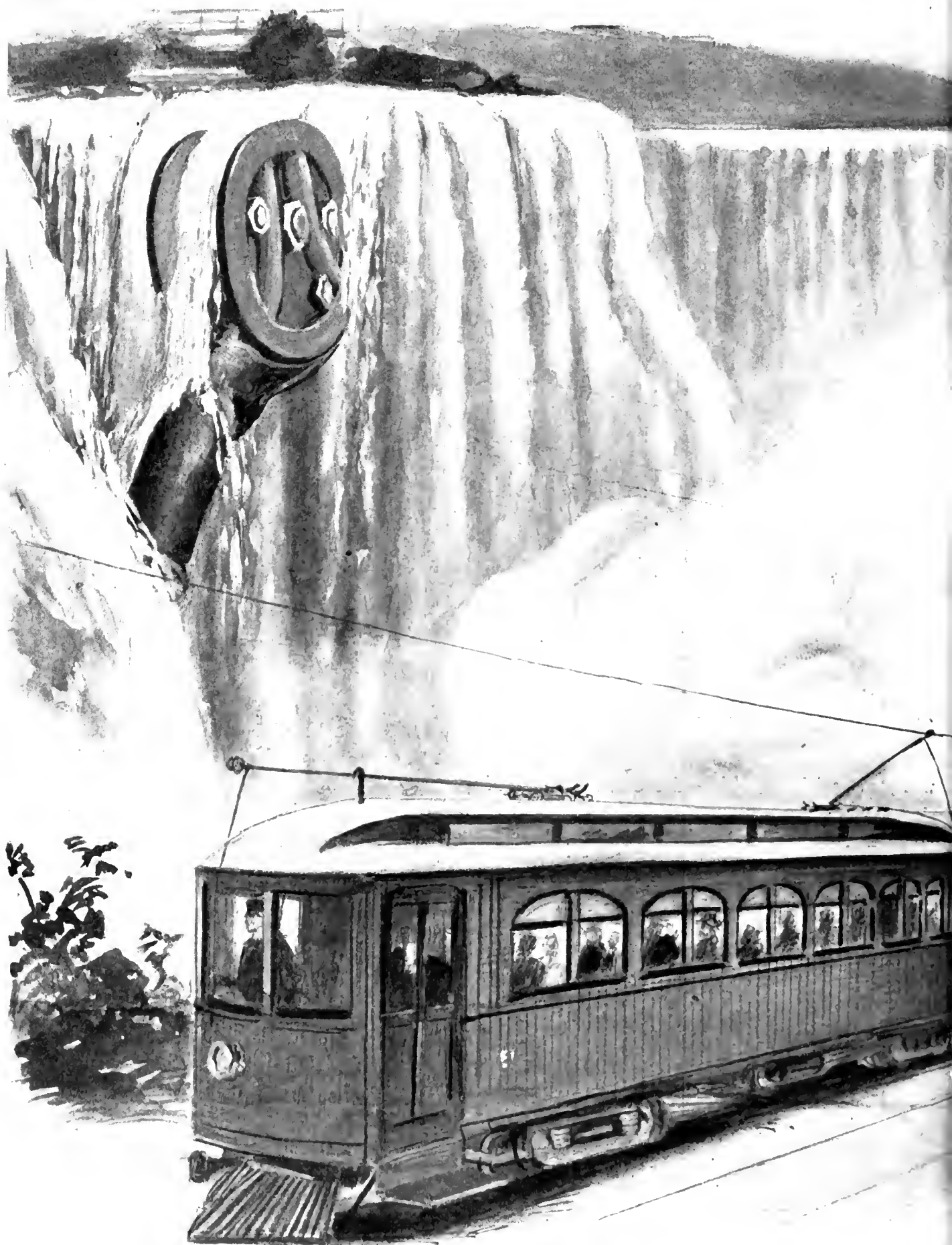
Chicago

San Francisco

Detroit

Louisville





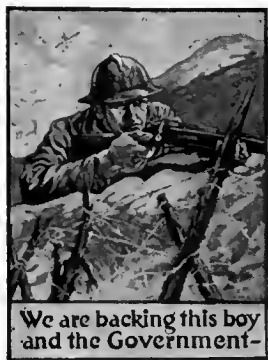
# On the Road to Niagara Falls Miller Trolley Shoes Are Now Standard

Following its first experience with Miller Trolley Shoes in the fall of 1916, one of the largest interurban systems of the East began to send one repeat order after another, until today some fifty-five of its high-speed cars have been equipped to care for the

## Important Excursion and Business Service on the Lockport and Niagara Falls Lines

Although the tension has been lowered from a range of 35-40 lb. to a range of 25-30 lb., the Miller Trolley Shoe hugs the wire better than wheels ever could to the unbounded satisfaction of the trainmen.

The practice of a road like the foregoing proves again that the



**Miller Trolley Shoe  
Is the Ideal Collector for  
Interurban Service**

## Miller Trolley Shoe Co., West Newton, Mass.

SPECIAL REPRESENTATIVE: Holden & White, Inc., Chicago

### SALES REPRESENTATIVES

Alfred Connor,  
Denver, Col.

T. C. White & Co.  
St. Louis, Mo.

S. I. Wailes,  
Los Angeles, Cal.

F. F. Bodler,  
San Francisco, Cal.

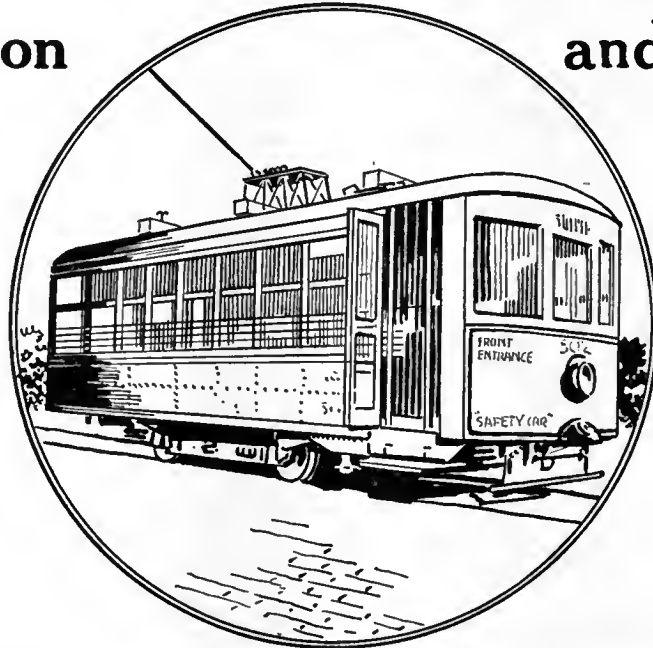
W. F. McKenney,  
Portland, Oregon.

W. M. McClintock,  
St. Paul, Minn.

# INTERNATIONAL

Fare Collection

and Registration



## For Single-End Operation One-Man Light-Weight Safety Cars

As yet nobody knows to what degree the Light-Weight Safety Car is going to displace the slower-moving, more costly big fellows; but it has already proved itself worthy on lines that are of real importance as revenue producers. The new conditions due to the operation of such cars by one man instead of two and the need for meeting local variations in fare units have received our earnest thought. If the following

### *Suggestions for Single-End Cars*

do not fit your case, tell us what you want and we'll see that you get it.

**FOR STRAIGHT 5-CENT CASH FARES—**Use the International C 15 hand operated Coin Register on lines where traffic is moderate, or motor operated when traffic is heavy.

**FOR CASH AND TRANSFERS—**Use the International C 21.

**FOR CASH AND PAPER TICKETS BUT NO TRANSFERS—**You can use the International C 21 just as readily, lettering the two registering mechanisms accordingly.

**FOR CASH, PAPER TICKETS AND TRANSFERS—**Use the International C 22, a three-section machine with the central division operated via the fare box crank, while the other sections have pull cords.

**FOR CASH AND METAL TICKETS—**Use the International C 14.

**FOR CASH, METAL TICKETS AND TRANSFERS—**Use the International C 20.

**And any one of these Internationals can be furnished in the Motor-Driven Types originated and perfected by us.**

## THE INTERNATIONAL REGISTER COMPANY

15 South Throop St., Chicago

Manufacturers of Coin Registers, Fare Boxes, Double and Single Car Registers and Fittings,  
Conductors' Punches and exclusive agents for Heeren Enamel Badges

## It Does More Than Merely Encourage Coasting—It Develops the Best Car Operation



Showing recorder location on one of the cars of the Connecticut Company

Any device which will aid in educating motormen to run cars on schedule with the least use of current is of course extremely valuable from the standpoint of economy alone. But the great value of the

## Arthur Power-Saving Recorder

is not only that it attains this desirable result but also forces the motorman to observe the rules of best practice if he wants to have this device show a good record of his work.

For example, you want your men to report promptly any defect in car equipment so that it may be remedied with the least expense and also to insure against accident liable to occur from such defects if they are permitted to "run along."

The motorman who is endeavoring to make a good record on the Arthur Recorder will be certain to make such reports

promptly because if there is anything wrong with the car equipment it makes it harder *for him* to show the record he is after.

Again, you want your men to eliminate unnecessary stops and slowdowns and thus decrease wear on brake shoes and wheel tires. You want them to make smooth starts and stops. You want them to avoid spurts of high speed.

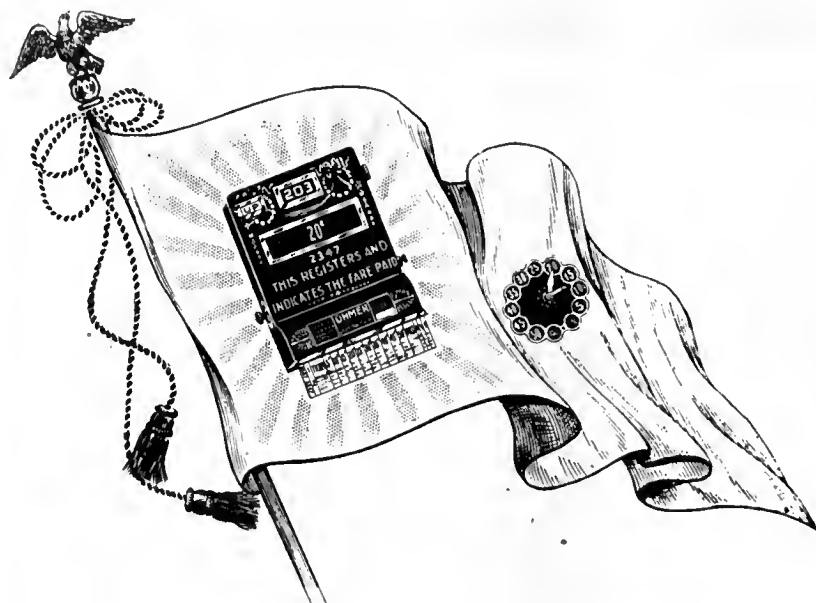
And these results are just samples of what the Arthur Recorder accomplishes *besides* reducing energy consumption.

Ask us for the whole story.

***"Power wasted is the true measure of the motormen's relative efficiency"***

**The Arthur Power-Saving Recorder Co.**  
New Haven, Conn.





# The Ohmer System a Wartime Measure

The Ohmer System stands for economy. It is a proper wartime measure for the successful and profitable operation of electric railways. The Ohmer System gives thorough fare protection. Its cost to the user is small.

The Ohmer Fare Register, which is the basis of the Ohmer System, makes possible really effective fare protection. Mechanical accuracy and durability have always been considered of first importance in its construction. It is fool proof. It is shipped from our factory with the O. K. of the most thorough of testing departments. It is installed by our own skilled mechanics and it is maintained by us. We do all this so that our patrons may be absolutely sure that their business with us will be more than justified. We do not sell you a machine, but we do sell you service. We become your consulting experts on all matters pertaining to fare protection. We are specialists in this line and during our many years of experience we have met and solved a great many problems. Let us solve yours.

**OHMER FARE REGISTER COMPANY**  
DAYTON, OHIO

It Saves Both Fuel and Labor

# DURADUCT

—of course

## It saves Fuel

because, being 80% to 90% lighter than metal conduit, there is less dead weight to propel—therefore less fuel is necessary for power.

## It saves Labor

in your repair shops because every hour your men require for conduit bending and threading has to be paid for. DURADUCT is bent by hand.

The Boston Elevated Railway has used hundreds of thousands of feet of DURADUCT because it is non-collapsible — flame-resisting — waterproof — lighter than metal and

## Saves Fuel and Labor

*Send for a Copy of  
"Specification: for Street Car Wiring."*

**TUBULAR WOVEN FABRIC COMPANY.**  
MANUFACTURERS — PAWTUCKET, R. I.  
GENERAL SALES AGENT — A. HALL BERRY  
71-73 Murray St., New York. — 9 SO. CLINTON ST. CHICAGO.

*Northern Electric Company* Distributors for Canada  
LIMITED

# Mr. General Manager

Each Bonham Traffic Recorder you install will save you One Dollar every day you use it.

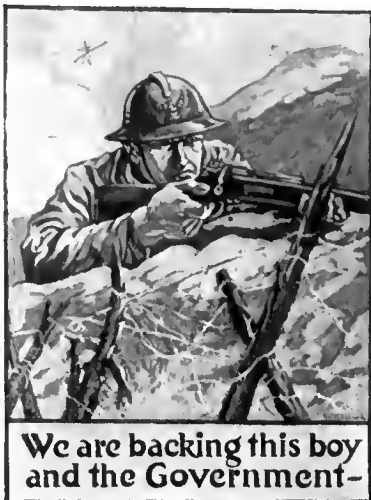
## *Study this Bonham Traffic Record*

It gives you a daily detailed account of your business both by stations and by trains, showing where to eliminate unnecessary car miles, thereby

## *saving Power, Men, Wear, Money*

This is only one of the many savings made by the Bonham System. Ask us about it.

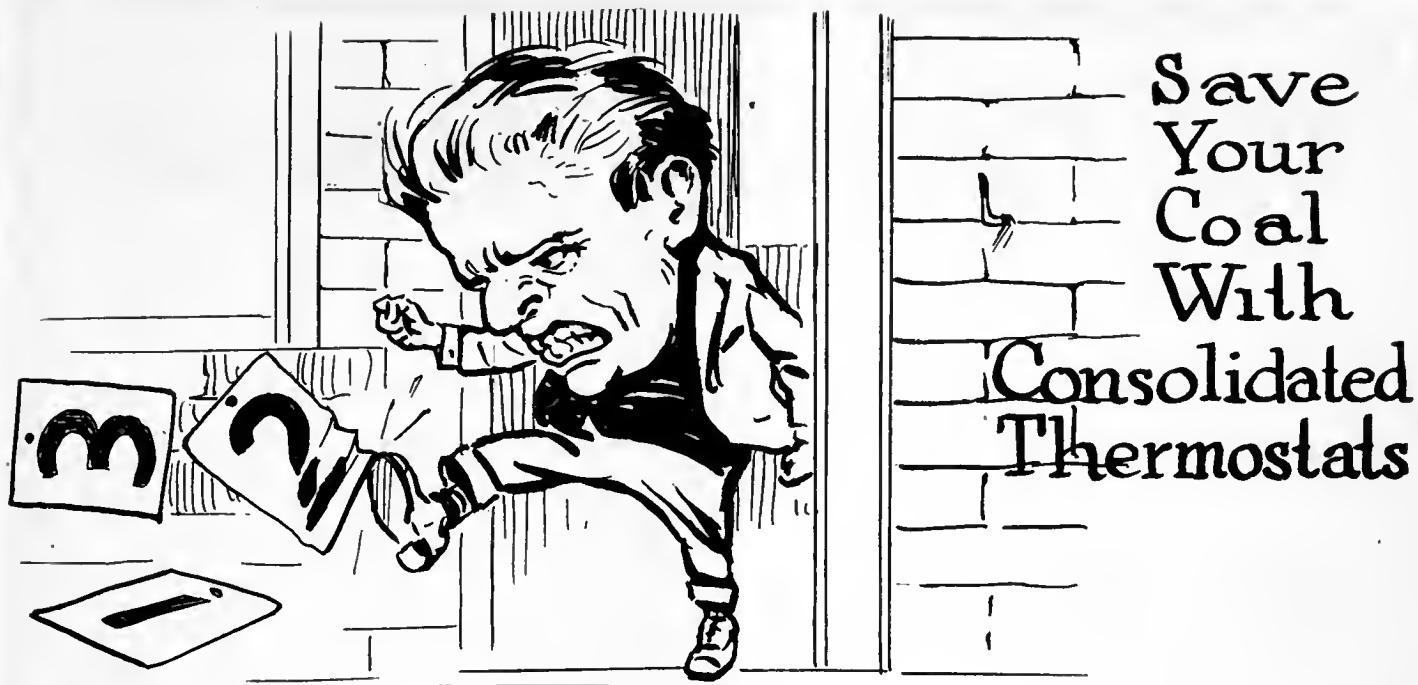
TRAFFIC RECORD					
DATE March 1, 1918					
TRAIN No. 75					
STOP NO.	PASSENGERS		LOAD	REVENUE	
ON	OFF				
1	30		30	11	94
6	4	3	31		36
9	5	2	34	1	62
12		2	32		
15	5	2	35		55
18		5	30		
21					
24		1	29		
27					
30	7	6	30	1	95
33		1	29		
36	4	2	31		36
39		1	30		
42		1	29		
45	9	9	29	1	12
48		3	26		
51	6		32		72
54	7	4	35		63
57	5	1	39		30
60	7		46		35
63		46			
				19	90



We are backing this boy  
and the Government-

## The Bonham Recorder Company

Hamilton, Ohio



One of the first things that electric railways have been asked to do to conserve coal has been to cut down car heating.

To cut off car heating entirely in wintry

days would evoke many bitter protests. But you can cut down the current now used for heating anywhere from

## 33 to 66 per cent by using Thermostatic Control

Hand-operated switches and the "1-2-3" carhouse sign scheme are utterly out of date. The average conductor has too much to do to give detailed attention to heater manipulation. When the car starts in the raw morning hours he puts on "No. 3" and there it's liable to stick until the passengers actually complain of the stuffiness.

Consolidated Thermostats relieve you of all dependence on human fallibility. They keep the car at the predetermined tempera-

ture, taking full advantage of the sunshine hours.

When the rush-hour comes, with its demand for more tractive power, substantial relief is afforded by the automatic decrease of the heater requirements due to the larger number of people on the car.

It is sound business as well as sound patriotism to equip all your cars with Consolidated Thermostats.

### All Consolidated Specialties

Heaters—Thermostatic Control—Pneumatic Door Operators—  
Car Starting and Stopping Signals—Special Resistances—

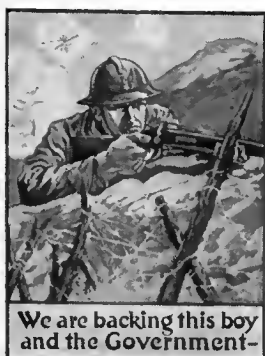
Are Broadly Protected by Patents

**CONSOLIDATED CAR-HEATING CO.**

ALBANY

NEW YORK

CHICAGO



We are backing this boy  
and the Government—

# SKEE BALL

## FOR TROLLEY PARKS

The Bowling Game with a Punch that has a thrill for player and spectator alike. The leaping balls give a life to the game that no crowd can resist. A smashing big success for four years and daily growing stronger. Read the following:

Petersburg, Va., January, 1918..

Mr. J. W. Harper, Sec. and Treas.,  
1536 Sansom Street, Phila.

Dear Sir:

We have a fine place and Alleys are running to capacity. I proposed SKEE-BALL as headliner for this Arcade and am very glad people are taking to the game, and Alleys making good and getting the greatest play ever. When the rest of the building is completed we intend to open new rooms, and you may rest assured the first thing in them is SKEE-BALL. Both Mr. S. W. Cohen and myself are greatly obliged and thank you for prompt and courteous service rendered, and both appreciate same very much.

A. COHEN.

This is the experience of hundreds in towns and cities ranging in population from 500 to 5,000,000; genuine, actual experiences, not guess-work or estimates. Fifty per cent of our sales are to customers who have already tried out the game to their entire satisfaction.

SKEE-BALL is a popular and profitable investment for TROLLEY PARK owners. The Alleys are installed in many parks throughout the country and they usually earn two or three times their cost during the season. Five Alleys were installed in the P. R. T. WILLOW GROVE PARK, Pa., last season, and were played to capacity until the close of 1917. Some parks have twenty Alleys in operation, and they are the most profitable and chief attraction there.

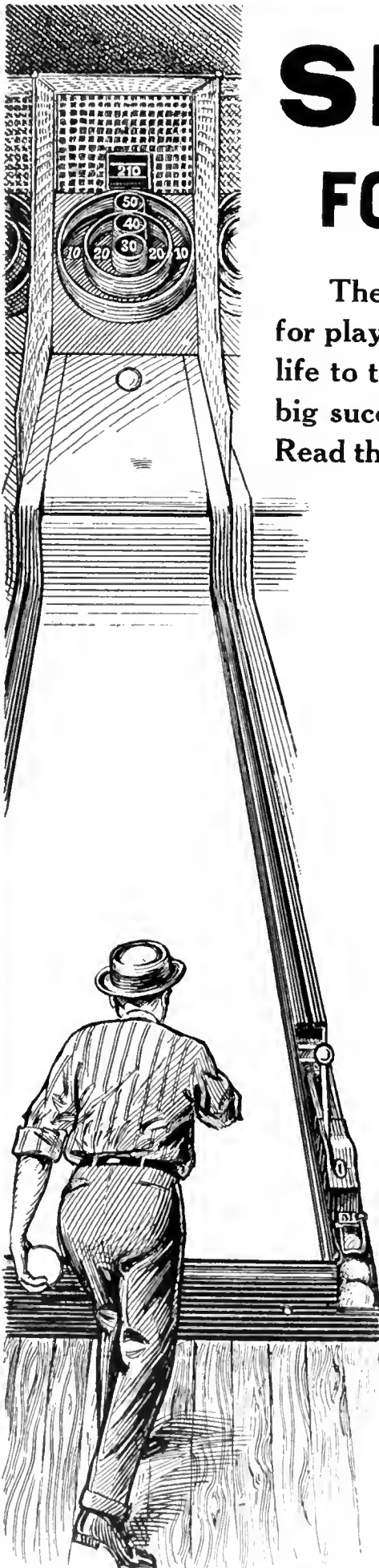
SKEE-BALL is fully covered by domestic and foreign patents.

WRITE FOR ILLUSTRATED CATALOGUE

## The J. D. Este Company

Owners — Patentees — Distributors

1536 Sansom Street, Philadelphia





## "Noark" N E C Fuses are approved and labeled by the Underwriters

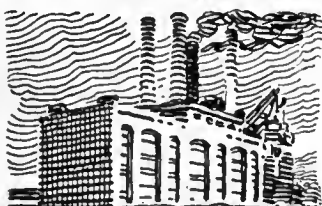
**Y**OU can insure against fire and bond against theft, but when a burned out circuit sends in a bill you pay in terms of valuable equipment and costly shutdowns.

That is why we advise you to judge a fuse strictly on a basis of accuracy and dependability. We believe a fuse should be built up to a standard and not down to a price. And that is the way we make "Noark" N E C Fuses—on a laboratory basis to conform strictly to an accurate design.

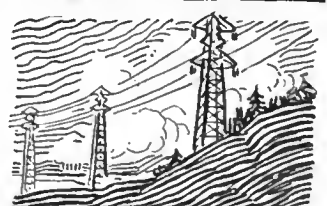
We offer "Noark" N E C Fuses as the finest you can buy. They are backed by 20 years of reliability and satisfaction and are approved and labeled by the Underwriters' Laboratories, Inc. Today "Noark" Fuses are guarding millions in equipment for thousands of users.

Manufactured by the  
JOHNS-PRATT CO., HARTFORD, CONN.  
H. W. JOHNS-MANVILLE CO., Sole Selling Agents

H. W. JOHNS-MANVILLE CO.  
NEW YORK CITY  
*10 Factories—Branches in 61 Large Cities*



# JOHNS- MANVILLE





# ARE YOU GETTING FULL Trade-Mark BOUND BROOK Reg. U. S. Pat. Office OIL-LESS BEARING

Here is a table of the wheel and bushing mileages obtained by various users of Bound Brook Bushings, which shows a most astonishing range of life despite the fact that Bound Brook Graphited Oil-less Bushings are absolutely uniform and are noted for the consistent individual mileage they give for any one combination of service characteristics.

	Wheel Dia., Inches	Wheel Miles	Bushing Miles	Tension Pounds	Amperes Carried	Composition, per Cent
Railway No. 1—City	4	8,600	8,600	25	200-250	89 Cu; 10 Tin; 1 Anti.
Sub.	6	8,600	8,600	30	400-500	89 Cu; 10 Tin; 1 Anti.
Railway No. 2.	6	29,000	10,900	22	200-400	Special
Railway No. 3.	....	9,000	98% outlast the wheel	20	500	88 Cu; 10 Tin; 2 Zn.
Railway No. 4.	5	15,000	15,000 or more with better inspection	22-25	400	Special
Railway No. 5.	4½	6,500	Equal with better inspection	20-24	300	Special
Railway No. 6.	4	27,633	27,633	25	.....	Special



## Bound Brook Oil-less Bea

# MILEAGE OUT OF YOUR GRAPHITED FOR TROLLEY WHEELS



All of the railways in this table operate at practically the same speeds except where suburban service is noted. Yet observe that

Bushing life ranges from a minimum of 8,600 to a maximum of 27,633 miles or more; and it would seem from the other factors noted that peripheral speeds, currents and tensions are not determining factors.

It seems significant, however, that those railways which are using short-life composition trolley wheels also get a short life for the bushing; while those using long-life wheels find the bushing perfectly capable of lasting as long as the wheels.

Isn't part of the answer to be found in the application of better maintenance of line and of current-carrying equipment on the car? We should be glad to have similar records from you because—

We don't want Bound Brook Oil-less Bearing service to stop with our delivery of the product to you. We want to know just what results you are getting and under what conditions of operation, so that we can help you to get more miles per bushing on your property and perchance improve the bushing for all properties.



ing Co., Bound Brook, N. J.

# "D & W" Products

## Make Ideal Maintenance Easy

DELTATAPE permits the winding of a much better ribbon wound field coil than the old asbestos. The Deltatape treatment eliminates all short-circuits.

DELTABESTON Magnet Wire withstands excessive heat and moisture. It served on Seattle's motors 14 years without a breakdown.

D & W FUSES positively will blow without noise or flame. ALL cars of the Interborough Rapid Transit Co., New York, use them exclusively.

At any place D & W products will cut motor maintenance costs and reduce the greater though less tangible item of lost car-hours due to breakdowns in service.

*Remember The Big Three*

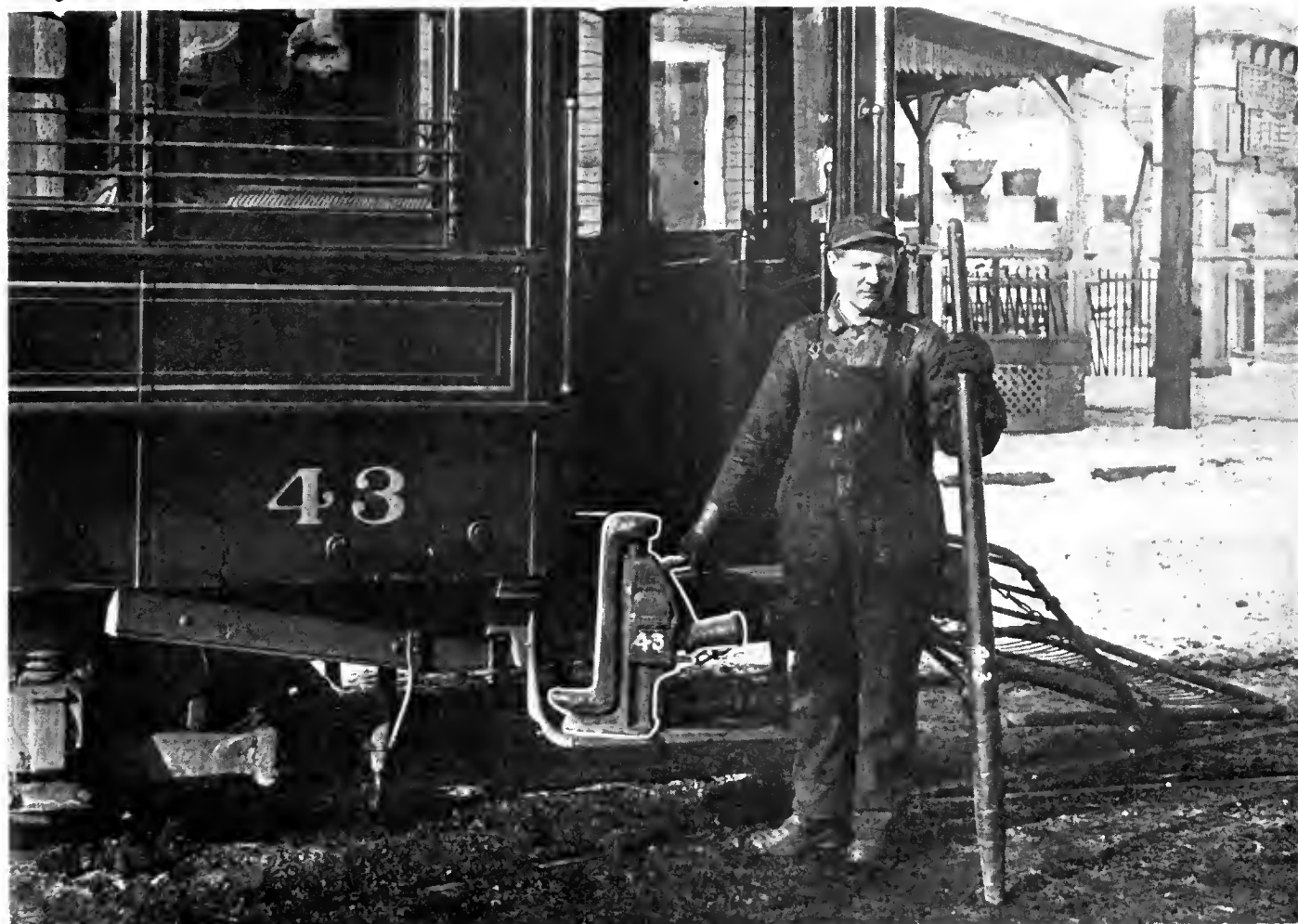
**Deltabeston—Deltatape—D & W Fuses**



**D & W FUSE CO.**  
PROVIDENCE, R. I.



Interborough Train Equipped Throughout with "D & W" Fuses



## Ready for Both Line and Shop

Duff Genuine Barrett Jacks are standard for emergency service wherever cars are equipped with jacks for that purpose.

### As Car Jacks

they prevent many minor accidents from becoming fatal, and prove wonderfully helpful in clearing the track of stalled vehicles.

The No. 239 Jack, shown above, is a popular type with electric railways, who decided in favor of a *jack on every car*. Constructed with a drop forged swiveling claw, with a sideways swing of 120° it is easily operated in close quarters, and clearance can always be obtained for the operating lever. It is used either vertically, or inclined up to a 15° angle, and lifts its full rated capacity on either head or claw. When used inclined with claw swinging out from frame, a derailed car is quickly moved horizontally back on the track.

An interesting bulletin has just been printed, describing Duff Car Jacks and other Duff Jacks used by electric railways. Send for a copy to-day.

### As Shop Jacks

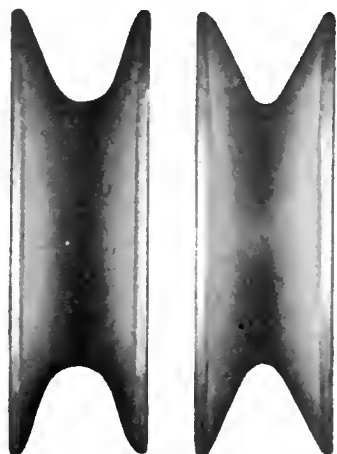
they are applicable to a great variety of lifting purposes, particularly at terminal inspection points, where only one shopman is available.

**THE DUFF MANUFACTURING COMPANY** Established 1883 **Pittsburgh, Pa.**  
 New York Chicago Atlanta St. Paul San Francisco

# DUFF GENUINE BARRETT JACKS



# "Bayonet" High-Speed Equipments



"U"

"V"

## From end to end of the Trolley Pole

**Keep Your Cars always "on time" and Increase your PROFITS and your SAVINGS**

### "Bayonet" Special Trolley Wheels,

made of all new metal of the highest quality. No scrap or cheap alloys used. Perfectly moulded and machined. Perfectly balanced. These features explain why they are giving double the mileage of most wheels on the market. Competitive tests have demonstrated their superiority. They eliminate all your trolley-wheel troubles.



### "Bayonet" Detachable Trolley Harp

is the only harp that can be **changed in ten seconds** without tools. Hands are the only tools required, on top of car. If necessary to take to the work-bench for repairs, adjustment and lubricating, it is eminently convenient; and the work is better done where everything needed for perfect work is at hand. This eliminates unsatisfactory patchwork on top of car.

Perfect adjustment gives perfect traction and saves a third of your trolley-wheels. Saves your power, too.



### "Bayonet" Trolley Base with Detachable Pole Clamps

is the only Base on which the pole can be **changed in one minute**, and have a perfectly aligned wheel, **without tools**.

Long extension springs give greatest flexibility to pole action.

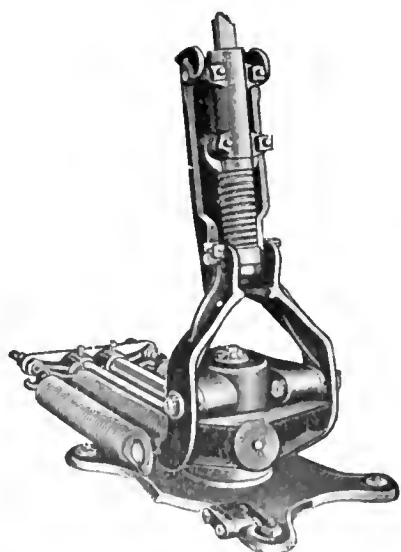
**Uniform wire pressure** at any angle of pole. No bent trolley poles.

Large steel rollers with removable, adjustable and interchangeable all-steel bearings give very sensitive rotary action and perfect traction. This saves wheels, poles and wire. If the overhead is right, the wheel will not leave wire. If faulty overhead throws the wheel, the Heavy Buffer Spring takes the shock and prevents damage to pole.

**Perfect Conductivity** is afforded by sliding contact between turret and base-plate.

Built for and tested on the heaviest and highest speed inter-urban cars made, this base has reached the highest degree of efficiency and durability and stands without a par as a time saver and barrier to trolley accidents and delays to rapid transit.

*For further particulars ask for our Catalog "B."*



**BAYONET TROLLEY HARP CO.**  
SPRINGFIELD, OHIO, U. S. A.



**"LE CARBONE"  
CARBON BRUSHES**



**ABSOLUTELY DEPENDABLE**

**W.J. Jeandron 173 Fulton St. New York**

# Trouble-proof Ball Bearings reduce maintenance costs

The use of ball bearings in motors and main journals not only saves power but also greatly reduces maintenance cost. Instead of inspecting and oiling twice a week you inspect once in three or six months.

Instead of running your babbitt shop over-time you can dispense with it altogether. Armature rubbing and all the troubles that follow are unknown. Delays and tie-ups due to hot boxes are also things of the past.



Set of 12 Gurney Bearings for Birney Safety Car. Two bearings are used for each journal box and two for each motor.

# GURNEY



Parts of Gurney Ball Bearing before assembling. No rivets or other parts are added.

## Simple construction

### Nothing to wear out

All the parts of the Gurney Bearing are shown above. There are two hardened chrome steel race-rings, a solid one-piece separator and the hardened chrome steel balls. The quality of the material in the rings is indicated by the fact that it costs from twenty to thirty-five cents a pound in the rough.

Such a bearing, properly mounted, needs no attention for months at a time.

Hundreds of cars equipped with these trouble-proof bearings are now making good in more than forty cities. Be sure you get the recommendations of our engineers before you buy new equipment.

**Gurney Ball Bearing Co.**

Conrad Patent Licensee

Jamestown, N. Y.

# NEY

# "Electroheat"

# AXLES

*insure*

***Increased***

***Safety***

***and***

***Service!***



Heat-Treating "Electroheat" Axles—The quenching operation which follows heating in the electric furnace

**T**ODAY the paramount thought of the railway operating man in every purchase he makes has become "Economy Always—but **Safety First.**"

Of vital importance in the production of steel axles is the **process** of heat treatment by which the essential physical properties of a good axle steel are obtained.

The "Electroheat" process in axle making has done more than to insure greatest possible safety through the high refinement of steel and improved physical qualities—it has made it pos-

sible to **consistently** produce axles having such uniformity in strength and toughness; which means greater over-all axle life with maximum safety.

That's why "Electroheat" Axles minimize service failures due to breakage, bending and excessive journal wear. That's why they **have** to give better service!

Note: "Electroheat" Armature Shafts possess the same torsional and shock resisting qualities as "Electroheat" Axles, being heat treated by the same process. They minimize service breakdowns and maintenance costs.



*"If Heat-Treated Electrically—It's a VALSCO"*

## LACLEDE STEEL COMPANY

General Offices—Federal Reserve Bank Building

SAINT LOUIS, MO., U. S. A.





## Front Entrance—Front Exit

*Require*

# Front Insurance

When passengers wish to enter or leave these Birney cars in Tacoma, Wash., they "step to the front."

Crowding towards the "business end" of a trolley car means greater danger of being knocked down and run over.

This possibility is amply guarded against in Tacoma by the installation of

### H-B LIFE GUARDS

They make Front End Accidents absolutely impossible!  
They are the last word in Safety Guards!

---

**The Consolidated Car Fender Co.**

Providence, R. I.

General Sales Agent

**Wendell & MacDuffie Co.**

61 Broadway, N. Y.



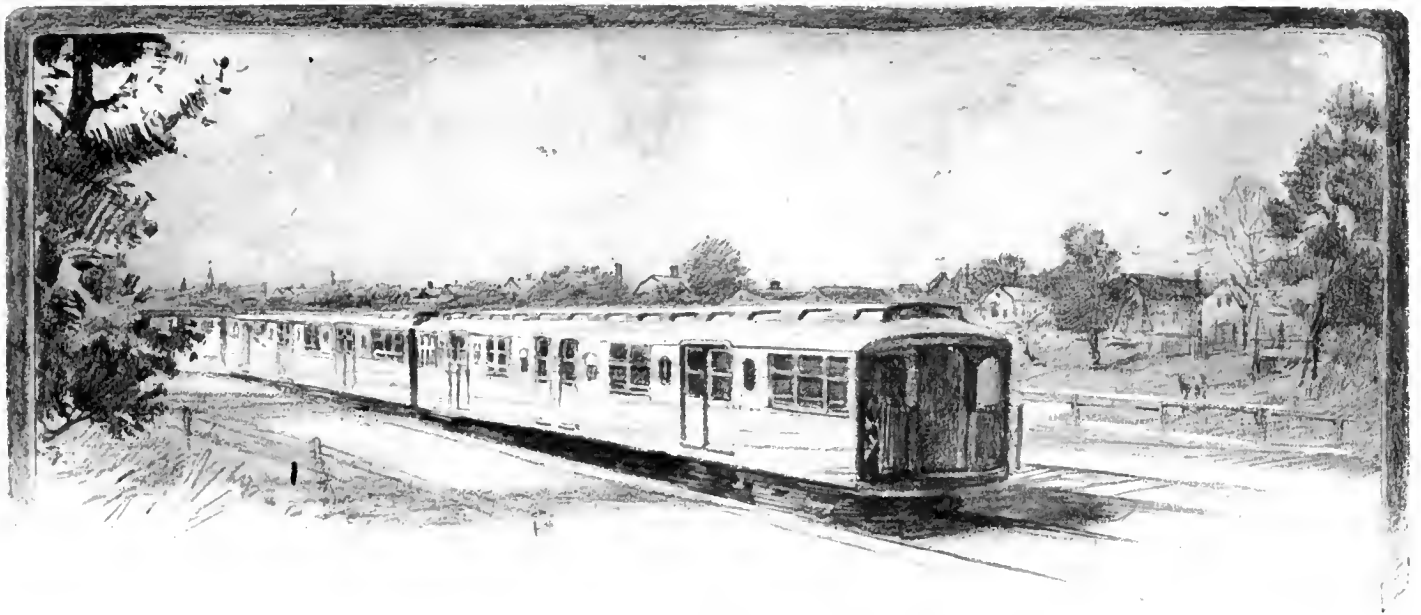
Boyerized Pins and Bushings have earned this name.

Whether in the brake or in the door fixtures Boyerized Pins spell S-A-F-E-T-Y for the car.

They are good for hundreds of thousands of miles, and reduce the cost of shop inspection.

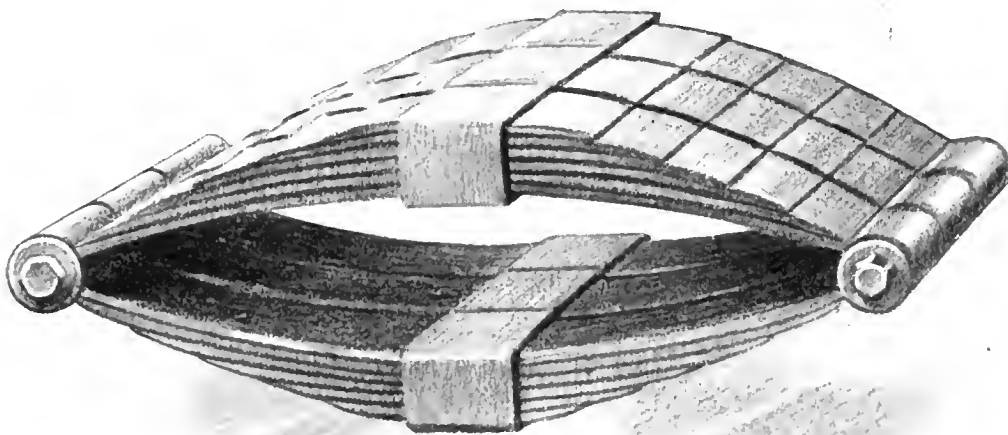
And yet—their net cost is lower per 1000 car miles than that of plain, cold-rolled pins.

**BEMIS CAR TRUCK COMPANY, Springfield, Mass.**



## Absorb Shocks

### By means of Springs instead of Mass



There are two basic reasons why you want Union specialized engineering principles applied to your cars.

First—Comfort for the passenger.

Second—Elimination of unnecessary weight.

The degree of comfort enjoyed by the passenger in his seat has its origin at the trucks. If the sudden changes in plane at the joints are not **immediately** absorbed by springs over the journal boxes, the shock is transmitted to the trucks and car body.

The elimination of unnecessary weight, which costs money to buy and money to carry, is accomplished by using springs instead of dead weight to secure easy riding. A car with a correct spring system not only costs less in itself, but saves wear and tear on track.

If you will consult with us before ordering new cars or rebuilding old ones, we may be able to reduce your car weight and increase your car comfort.

## UNION SPRING & MFG. CO.

General Office: 1207 Fulton Building, PITTSBURGH, PA.

50 Church St., New York

Works: New Kensington, Pa.

Fisher Building, Chicago

# Storage Batteries in Electric Railway Service

## LOAD REGULATION

For carrying peaks and fluctuations of load, especially in connection with water-power developments or where power is purchased on the basis of maximum demand, the "**Chloride Accumulator**" or the "**Tudor Accumulator**" is adapted.

## LINE REGULATION

Due to the present high price of copper there are cases where the use of a battery for maintaining voltage is more economical than the purchase of copper for feeders. The "**Chloride Accumulator**" has been largely used in this service by many railways.

## STANDBY SERVICE FOR EXCITER BUS

It is standard practice to install a storage battery connected to the Exciter Bus to prevent interruption in the supply of current for field excitation. Either the "**Chloride Accumulator**" the "**Tudor Accumulator**" or the "**Exide**" Battery can be used.

## OIL SWITCH SERVICE

Storage batteries are used in power houses and sub-stations for the operation of oil switches and supplying current for pilot lamps and emergency station lights in case of failure of the power supply. For this service the "**Chloride Accumulator**," the "**Tudor Accumulator**," and the "**Exide**" Battery are used.

## STORAGE BATTERY STREET CARS

For infrequent service or for conditions where trolley wires are prohibited, storage battery cars offer the most economical and profitable solution of the transportation problem. The "**Hycap=Exide**" Battery has been largely used in this service. In New York City alone there are in operation nearly 200 storage battery cars equipped with "**Hycap=Exide**" Batteries.

## MULTIPLE-UNIT CONTROL

The "**Exide**" Battery and the "**Tudor Accumulator**" are used by a number of railways for furnishing a supply of low voltage current to be used in connection with the operation of multiple-unit control systems.

## INTERURBAN CAR LIGHTING

A number of interurban electric railway companies have installed batteries on their cars to maintain steady illumination and to overcome fluctuations caused by changes in line voltage, interruptions in third rail at crossings and switches or by temporary failure of power supply. For this service the "**Exide**" Battery is particularly adapted.

## HEAD AND TAIL LIGHTS

The "**Exide**" Battery is being used in connection with head lights and tail lights for furnishing current in case of interruptions in power supply.

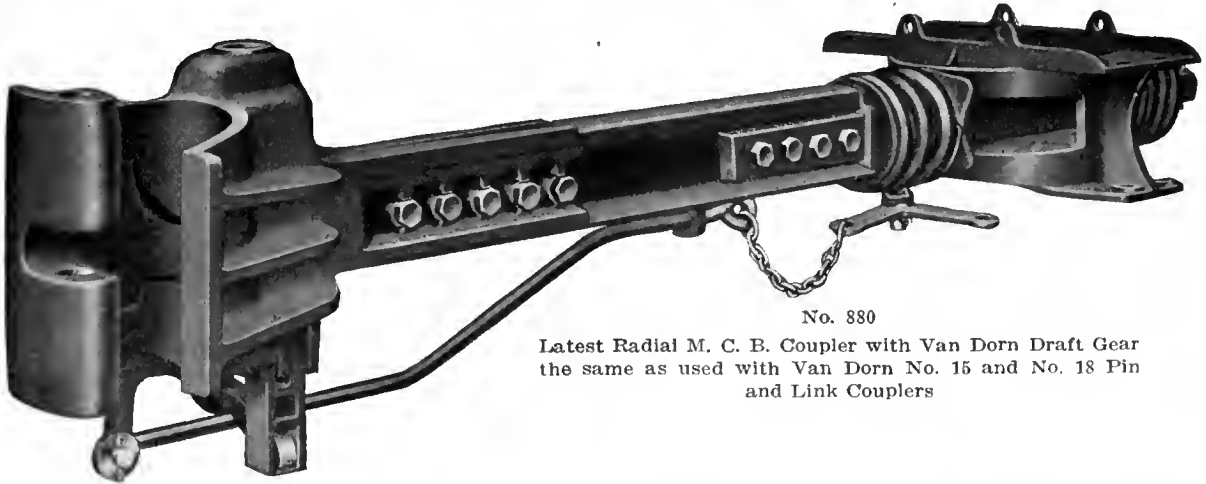
Detailed information on batteries for any of the above services can be secured from any sales office of the company.

# THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of

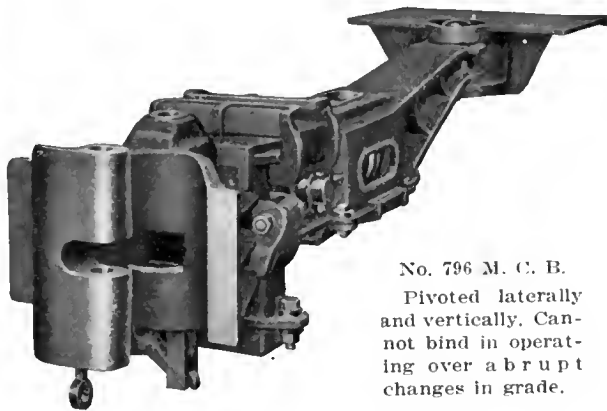
The "**Chloride Accumulator**", The "**Tudor Accumulator**",  
The "**Exide**", "**Hycap=Exide**", "**Tbin=Exide**" and "**Ironclad=Exide**" Batteries

New York Boston Chicago Washington PHILADELPHIA, PA. Rochester Detroit Minneapolis St. Louis  
Cleveland Atlanta Pittsburgh 1888-1918 San Francisco Denver Kansas City Toronto



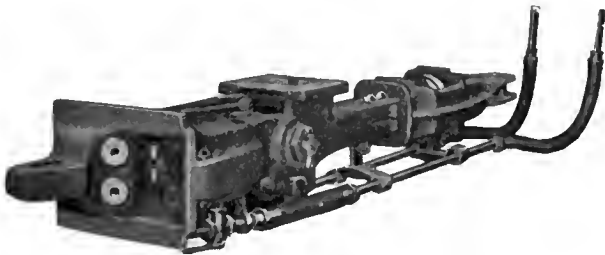
No. 380

Latest Radial M. C. B. Coupler with Van Dorn Draft Gear  
the same as used with Van Dorn No. 15 and No. 18 Pin  
and Link Couplers



No. 796 M. C. B.

Pivoted laterally  
and vertically. Can-  
not bind in operat-  
ing over abrupt  
changes in grade.



No. 400

Car and air coupler for heavy city and light interurban  
service



No. 21 1/2

Pin and link coupler for interurban service



No. 5

Pin and link coupler for light city service

# Van Dorn Couplers for Every Service

Van Dorn Couplers and Draft Gears are made in various types and sizes to meet the entire range of requirements of modern electric car operation.

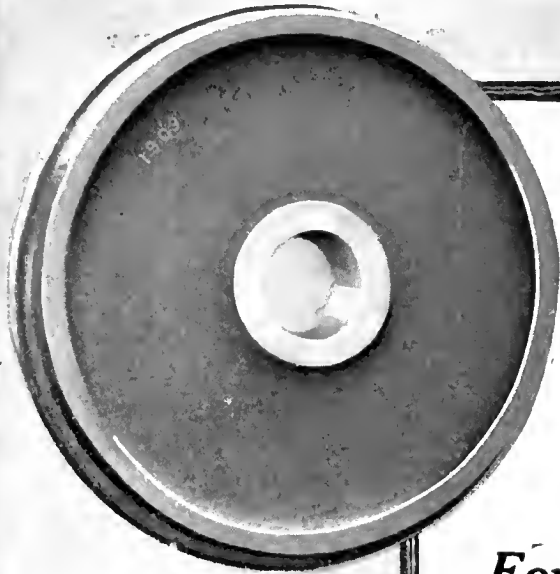
They embody many exclusive refinements of design and construction, each having special patented features.

If you require couplers for light-weight city cars or for the heaviest interurban types, or anything between, the Van Dorn line provides a coupler or gear that will meet your needs satisfactorily and economically.

Seven popular types are shown herewith. We have others. Write today for literature describing the entire Van Dorn line in detail.

**VAN DORN COUPLER CO.**  
2325 So. Paulina Street  
CHICAGO





## The Wonderful Single-Service Chilled-Iron Wheel

# Standard for 67 Years

The Chilled Iron Wheel has performed its every function at a minimum cost.

### *For Freight Cars*

95% of all cars in this type of service are carried on Chilled Iron Wheels.

### *For Street Cars*

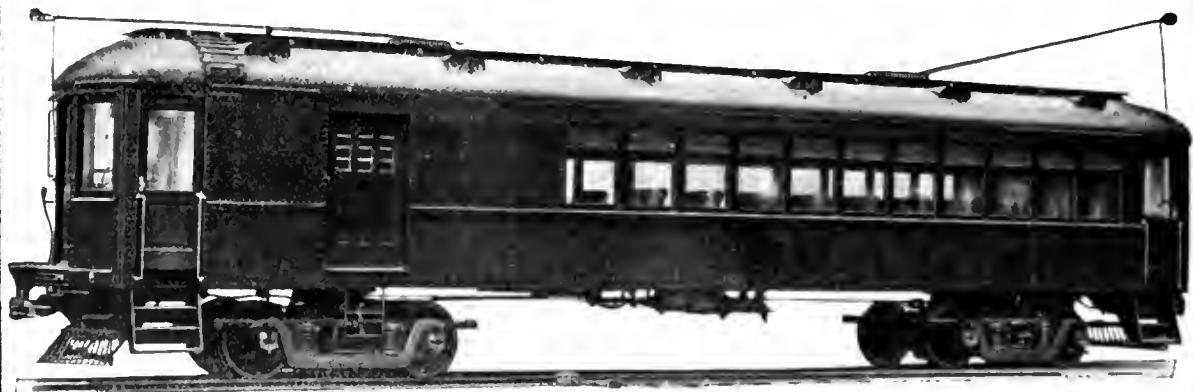
The Chilled Iron Wheel is Standard for Street Car Service in 95 out of 100 cities in the United States and Canada, operating 100 cars or over.

### *The Conclusion*

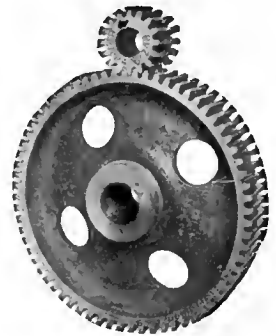
to be gained from these figures is that the Chilled Iron Wheel gives the Greatest Service for the Lowest Cost.

**Association of Manufacturers of Chilled Car Wheels**  
1228 McCormick Building, Chicago, Ill.

Representing Forty-eight Wheel Foundries Throughout the United States and Canada. Capacity 20,000 Chilled Iron Wheels Per Day.



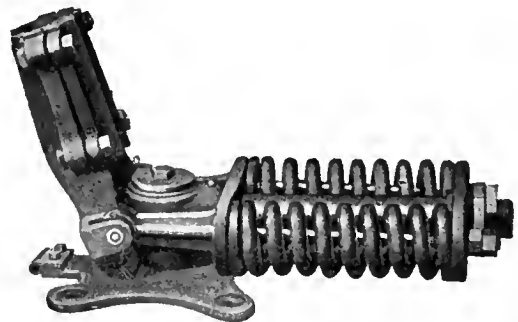
# Let Your Quick-Service Cars Prove the Economy They are Capable of



**THE GEARS**—They must be the best and most dependable since speed and dependability are the reasons for the existence of the quick service car. Ordinary gears cannot do it but **Nuttall BP** treated Quick-Service gears will—they are guaranteed to last four times as long as untreated cast steel gears in identical service, reducing greatly the ultimate cost through time saved in minimizing breakdowns and in less steel used per gear because of the great strength imparted to them by the **BP** treatment.

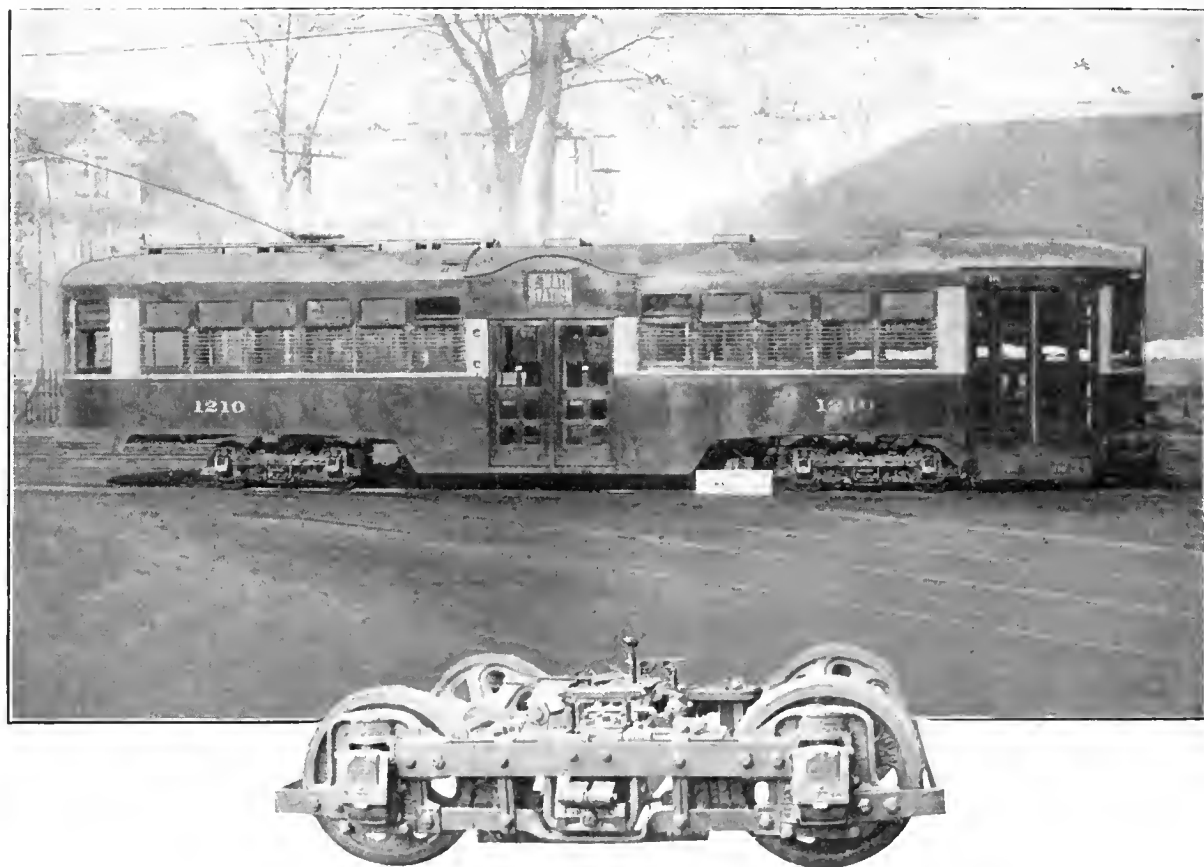


The No. 15 Nuttall Quick-Service trolley base is the logical one for this service—embodying all that experience, skill and high grade parts can put into a trolley base that is to give long satisfactory life and aid in giving dependable service through the equalization of track and overhead inequalities.



## NUTTALL PITTSBURGH

# For Extremely Low Level Cars



The new Taylor R.H. Truck.

## Taylor R. H. Trucks

These new reduced height trucks are built with exceptionally low center plates to adapt them for use on all the latest types of low level cars, with either center or end entrance.

Safety for high speed schedules is the prime feature.

Mounted on 26" wheels and designed

to receive inside hung "Baby" or "Wee" motors.

Ample clearance between the ground and the lowest part is obtained by the compact arrangement of parts.

The brake mechanism operates with a straight line action to eliminate twisting stress in applying the brakes.

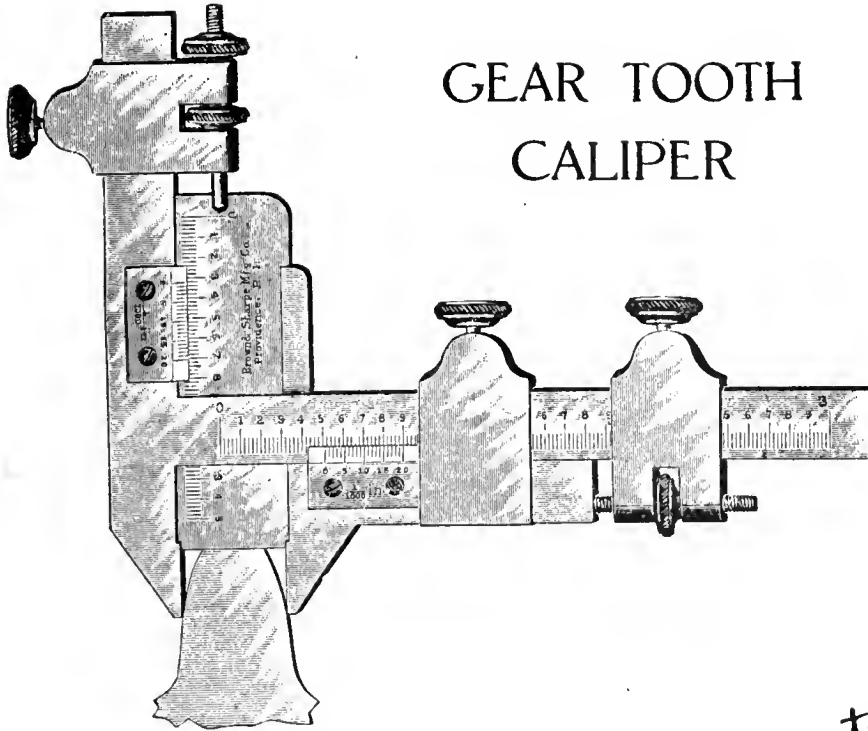
Operating companies and railway managers will be interested to receive full details of this latest type of Reduced Height Truck.

Portfolio sent on request.

## Taylor Electric Truck Company

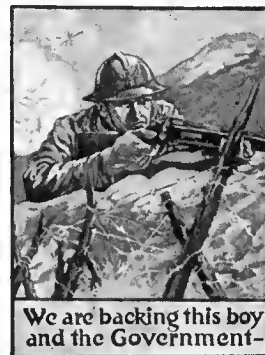
Troy, N. Y.

ESTABLISHED 1892



## GEAR TOOTH CALIPER

*We don't sell 'em  
but we use 'em to follow tests.  
Tests, carefully followed, always show the  
superiority of "Tool Steel" gears & pinions.*



**We are backing this boy  
and the Government-**

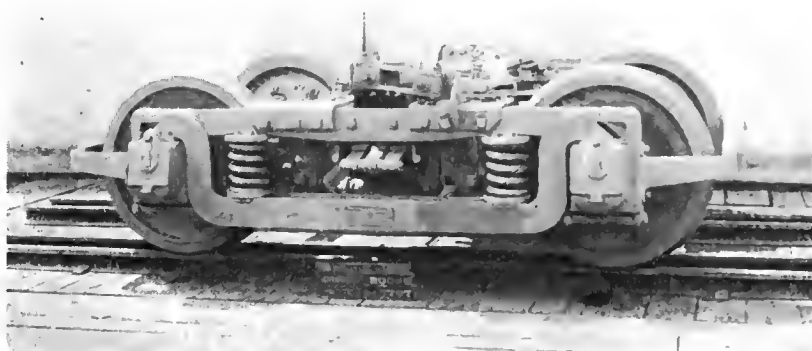
*The Tool Steel Gear Pinion Co.  
Cincinnati O.*

## Steel for Service

### Modern

electric railway equipment requires, to insure ultimate economy in expenditure, choice of the best designs and the best materials.

This car of the Cleveland, Southwestern & Columbus Railway is mounted on Brill 27MCB-3-X



trucks with the latest swing bolsters and is carried on 37" solid rolled steel wheels and AERA-EC axles made by Carnegie Steel Company.

The works of the Carnegie Steel Company are pioneers in the manufacture of

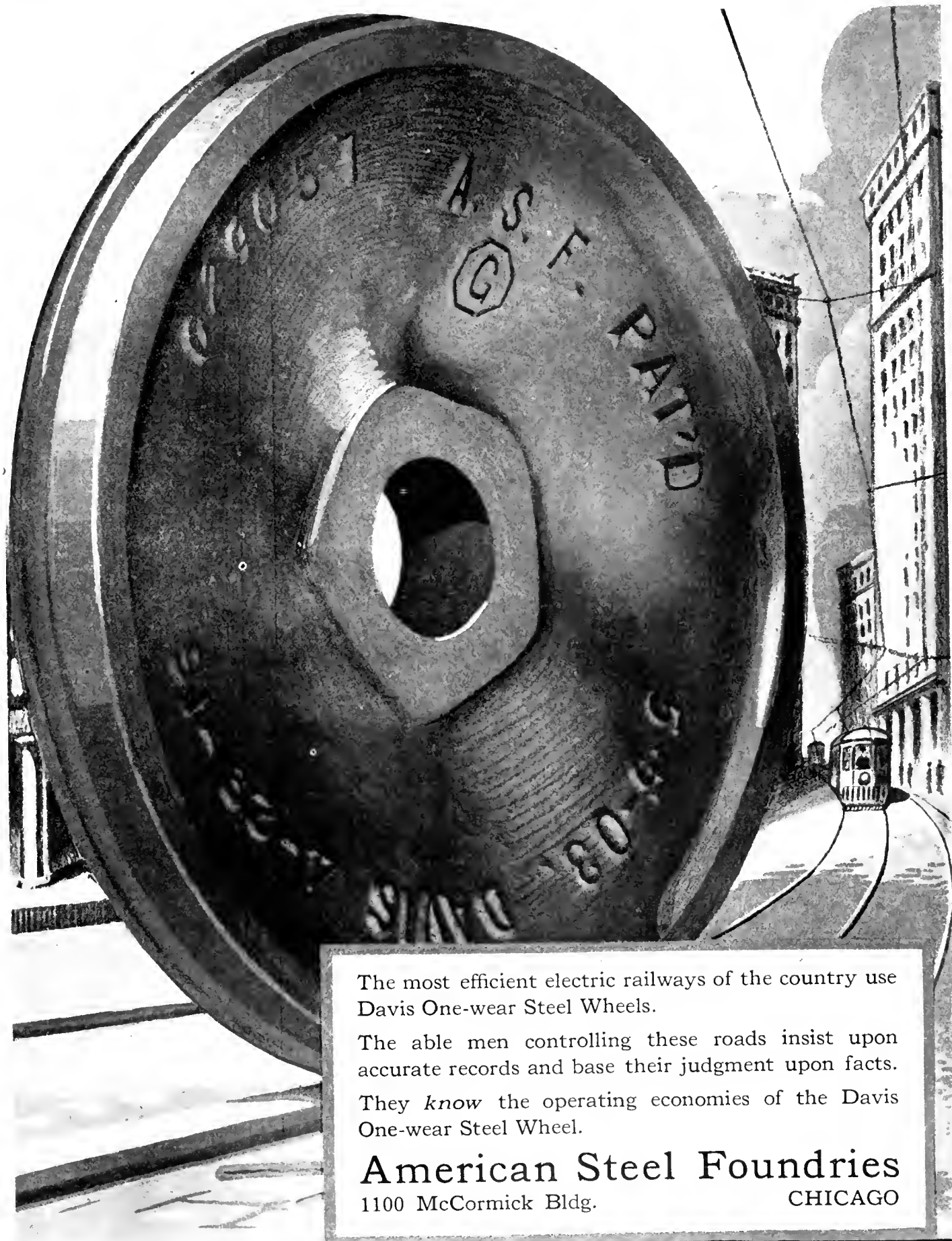
## Rolled Wheels and Steel Axles

That long experience is the user's best guarantee for perfection of materials, without which very best designs may not prove entirely satisfactory.

# Carnegie Steel Company

General Offices—Pittsburgh, Pa.





The most efficient electric railways of the country use Davis One-wear Steel Wheels.

The able men controlling these roads insist upon accurate records and base their judgment upon facts. They *know* the operating economies of the Davis One-wear Steel Wheel.

**American Steel Foundries**  
1100 McCormick Bldg. CHICAGO

# DAVIS STEEL WHEELS

## The Babbitt that's better



It stands to reason that a specialty product like More-Jones Armature Babbitt must be superior to ordinary babbitts.

Developed for armature bearing service exclusively. Made only of pure, new metal, perfectly amalgamated and of uniform composition.

## MORE-JONES : ARMATURE : BABBITT METAL

is unsurpassed for toughness and ability to withstand high temperatures. It will remelt over and over, maintaining practically the same physical properties unimpaired.

The mileage records made by More-Jones Armature Babbitt Metal prove it the most economical metal you can use. Give us an opportunity to show what it can do for you.

### More-Jones Brass & Metal Co.

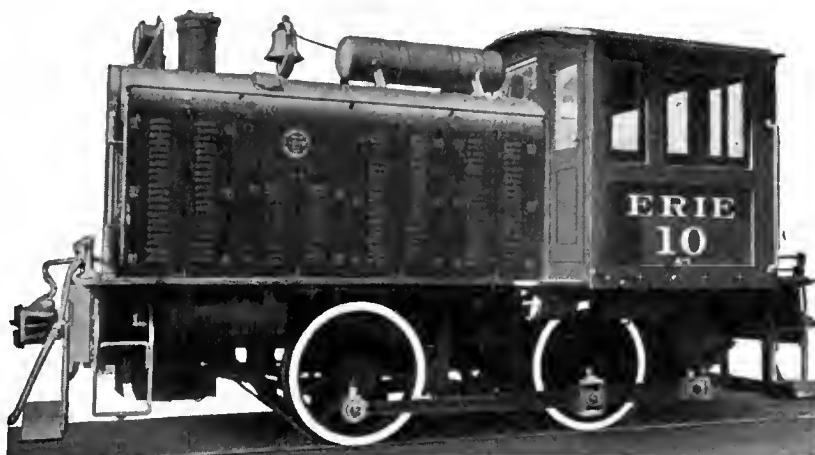
3134 No. Broadway

St. Louis, U. S. A.

*Further information and  
prices on application*

# Experience Counts

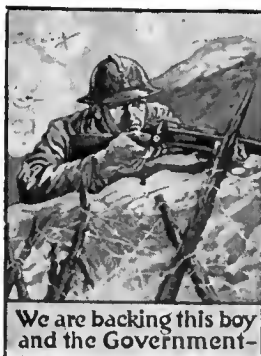
in the designing and building of locomotives for any kind of service, and especially is this true in the case of motive power for industrial, contractors' or other kinds of special work.



**Gasoline Locomotives** present important advantages for the kinds of service referred to above. They are simple to operate—dependent upon no external source of power—and always ready for work, although they consume no fuel while standing idle.

**Electric Railways** can use gasoline locomotives to advantage, for service about shops and power plants, for construction work and for terminal switching. These machines can go wherever a track can be laid, clearance limits permitting.

**Baldwin Experience** is a guarantee that Baldwin Gasoline Locomotives will be built right and will give good service. Record No. 85 contains full particulars.



We are backing this boy  
and the Government—

## THE BALDWIN LOCOMOTIVE WORKS

Philadelphia, Pa.

REPRESENTED BY

F. W. Weston, 120 Broadway, New York, N. Y.

Charles Riddell, 627 Railway Exchange, Chicago, Ill.

C. H. Peterson, 1210 Boatmen's Bank Bldg., St. Louis, Mo.

George F. Jones, 407 Travelers' Building, Richmond, Va.

A. J. Beuter, 312 Northwestern Bank Bldg., Portland, Ore.

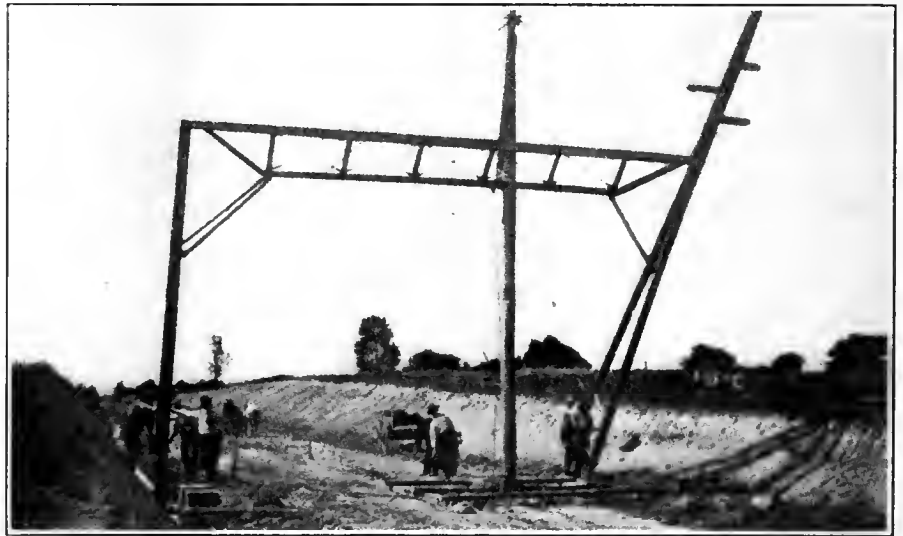
Williams, Dimond & Co., 310 Sansome St., San Francisco, Cal.

## Archbold-Brady Transmission Towers and Catenary Bridges

Archbold - Brady Bridges are assembled on the ground and raised in one piece, either by means of a gin pole or by derrick car or wagon.

### 15 Years' Experience

is behind Archbold-Brady Transmission Towers and Catenary Bridges.



**ARCHBOLD-BRADY COMPANY, SYRACUSE, N. Y.**

## For Improved Motor Operation

you want brush holders which allow brushes to be easily inspected and easily renewed—which do not require recessing of the brushes—which provide constant brush pressure—which do not require pigtails—which have no screws or nuts to become loose and cause trouble.

On that basis the selection narrows down to

### Lindall Brush Holders

They have been in service for several years on some of the biggest systems of the country—with attendant reduction in brush holder maintenance expense.

Made for any type of railway motor.

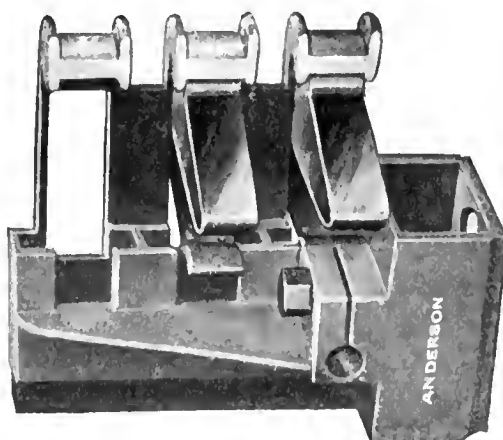
Write us for the bulletin and prices.

**Albert & J. M. Anderson Mfg. Co.**

(Established 1877)

289-293 A Street

Boston, Mass., U. S. A.



#### BRANCHES:

New York, 135 Broadway  
Chicago, 105 So. Dearborn Street  
Philadelphia, 429 Real Estate Trust Bldg.  
London, E. C., 48 Milton Street



# ECONOMY

renewable

## FUSES

cut annual fuse maintenance costs 80%



"Look for the Gray Shell"

Economy "Drop Out" Renewal Links are responsible for this saving.

A "Drop Out" Renewal Link restores a blown Economy Fuse to its original efficiency.

Does not sustain an arc. It's the work of a moment for even a novice to replace the link and renew the fuse.

First in its field—first in efficiency.

Order from your dealer or jobber.

## ECONOMY FUSE & MFG. CO.

Kinzie and Orleans Streets

CHICAGO, U. S. A.

Sole manufacturers of "ARKLESS"—The Non-Renewable Fuse with the "100% Guaranteed Indicator"



BEFORE TREATMENT WITH ATLAS "A"

These are results obtained by the use of Atlas "A" weed killer and track preservative as applied by

## THE Atlas "A" Method

This includes complete equipment for the sprinkling of Atlas "A" Weed Killer, the application of Odor Compound for cattle protection, and the entire supervision of the work by an Atlas superintendent.

### Give Us Your Weedy Track We'll Do The Rest

Don't wait until summer has come to prove what a costly nuisance a weed-clogged track can be.

Write now for an estimate of costs for treatment of your track by the Atlas "A" Method, and our booklet, "How to Keep a Clean Track."

**Chipman Chemical Engr. Co., Inc.**

95 Liberty Street, New York

65 DAYS AFTER TREATMENT

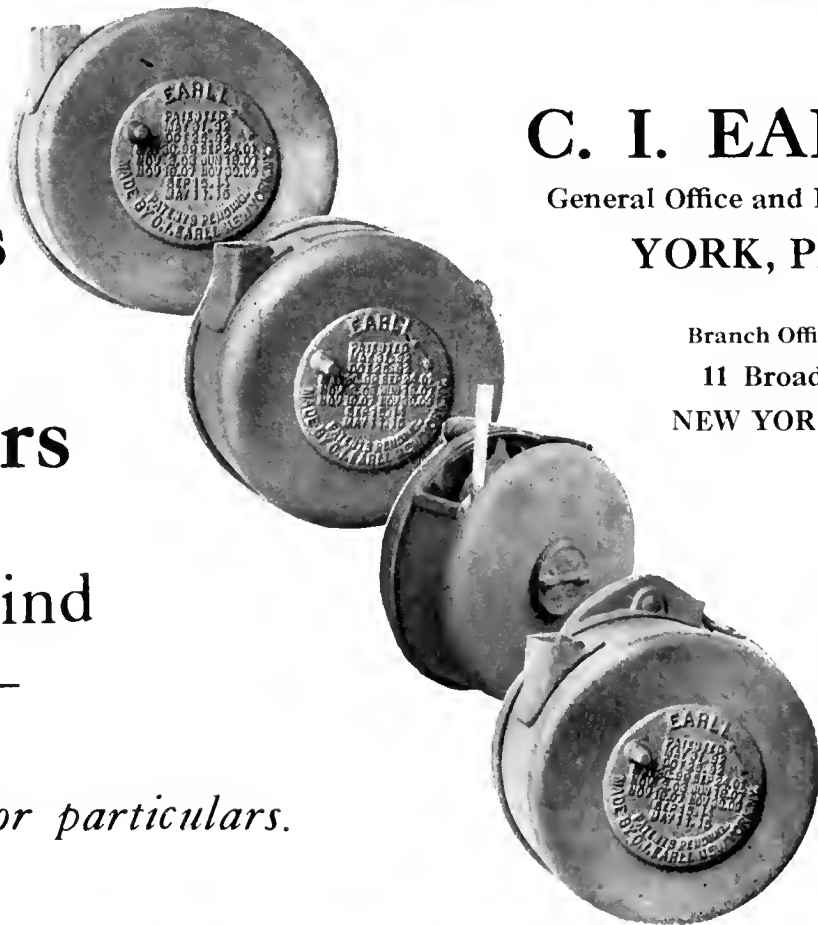




# Earll Catchers and Retrievers

for every kind  
of service—

*Write for particulars.*



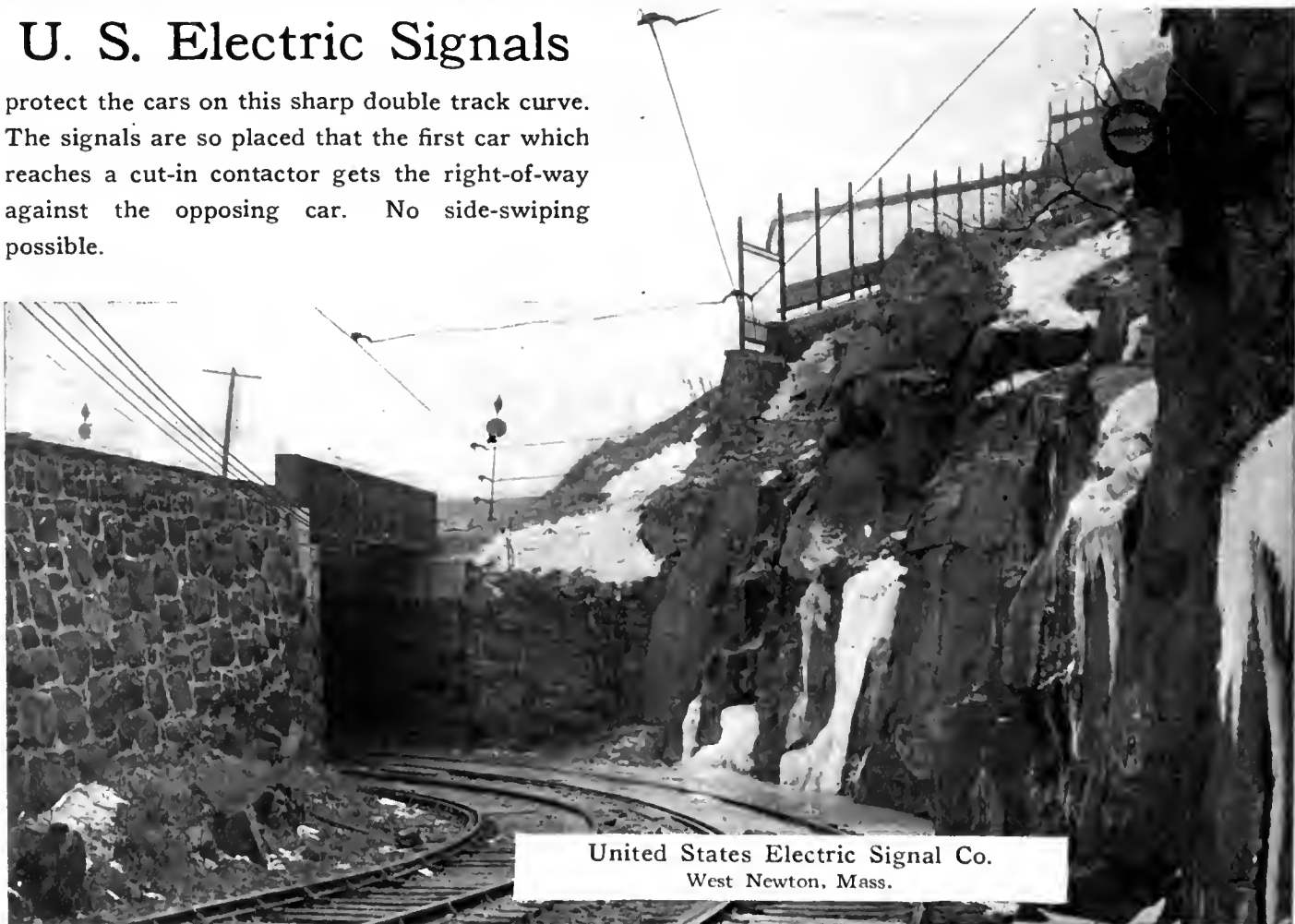
## C. I. EARLL

General Office and Factory:  
**YORK, PA.**

Branch Office:  
11 Broadway  
NEW YORK, N. Y.

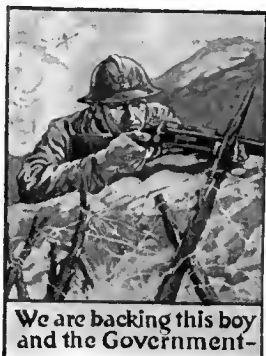
## U. S. Electric Signals

protect the cars on this sharp double track curve. The signals are so placed that the first car which reaches a cut-in contactor gets the right-of-way against the opposing car. No side-swiping possible.

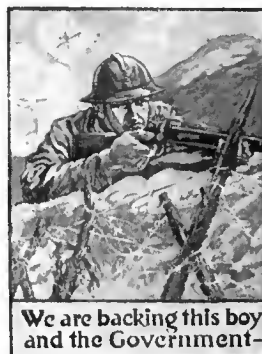
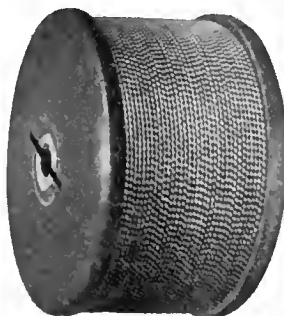


United States Electric Signal Co.  
West Newton, Mass.

# ROEBLING ELECTRICAL WIRES AND CABLES



We are backing this boy  
and the Government—



We are backing this boy  
and the Government—

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**STRAND**

**JOHN A. ROEBLING'S SONS CO.**  
TRENTON, N. J.

BRANCHES:  
New York    Boston    Chicago    Philadelphia    Pittsburgh    Cleveland  
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## “Pigs is Pigs”

(According to Ellis Parker Butler)

*but—Brooms  
is not always*

## Brooms



**J. W. Paxson Co.**  
102 N. Delaware Ave.  
Philadelphia, Pa.

Sometimes they're only an imitation of the real thing—PAXSON BROOMS—although you may pay just as much for them.

Paxson Brooms are built to meet every track need, with split bamboo for snow or dirt of a light nature and heavy steel bristles for removing caked mud, ice and other debris from switches, frogs, etc.

Prices on application.

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## Automatic Switch Stands

A permanent automatic switch stand which will safely take care of interurban service for passing sidings, which does away with spring in track. Furnished in all heights.

## Our T-Rail Special Work

For Your Interurban Line  
or Private Right of Way

Manganese construction is a great cost-cutter in maintenance. In all styles.

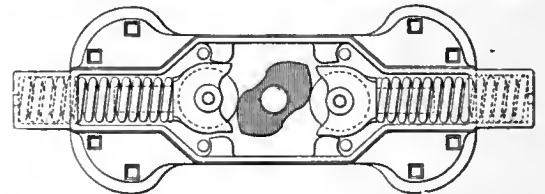
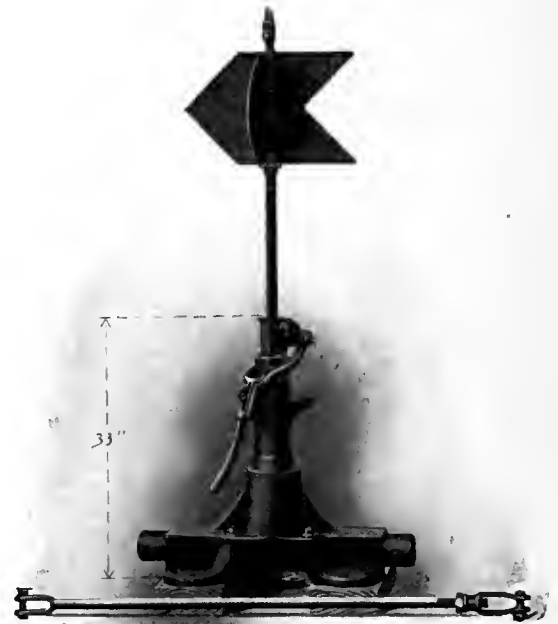
*Write us.*

## Ramapo Iron Works

HILLBURN, N. Y.

Main Office, Hillburn, N. Y.

New York: 30 Church St. Plants: Hillburn & Niagara Falls



Ramapo Pat. Automatic Return Switch Stand No. 37  
Showing Mechanism Half Thrown Automatically



Save labor—

Use our trenching service for  
excavating your track.

## Street Railway Track Excavation By Special Trench Excavator

Rapid and economical track  
work can be done with less  
labor in this well prepared  
machine made trench. Con-  
tracts taken by lineal foot.

*Write for Information  
and Circular*



608 TRUST  
BLDG.

**General Engineering & Construction Co.**

ROCKFORD  
ILL.



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## *Splicing—Friction*

The sixteen SHIELD BRAND high quality Splicing and Friction Tapes are now backed by the great seal of the United States Rubber Company.

*The Seal and the Shield*—a double guarantee of quality and satisfactory service.

Send for a sample to meet your particular needs.

**United States Rubber Co.**

*Mechanical Goods Division*

New York



## SOUK

Entering one of the large Souks in Tunis to look at rugs, silks or jewels, you are at once let into a young cabaret performance.

Quantities of cigarettes and coffee are furnished the prospective buyer as quality, texture and prices of articles are lightly touched upon.

You see, in this method of selling they put the heavy stress on entertainment—and by golly it works.

And right here in this country we see evidences where shoddy goes across under the whip of music, gasoline, etc.—yes, even in carbon brushes.

Not all brushes can be sold on the high engineering basis on which Morganite is prescribed. So the makers must adopt the Souk entertaining method.

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If you are not getting these two-color booklets tell us your address and you will have them.



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Charles Farnham, I. W. Hellman Bldg., Los Angeles, Cal.

## "They Grind Faster—and Last Longer"

is the report of the operator of this track grinding machine in speaking of NORTON ALUNDUM grinding wheels.

After years of experience in this particular work, he uses NORTON wheels exclusively and will have no other. In the picture shown a 24 N ALUNDUM wheel  $9 \times 2\frac{1}{2} \times 1$ " is turning out work satisfactory in every respect.

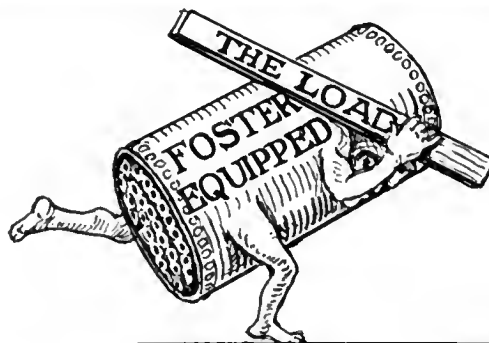
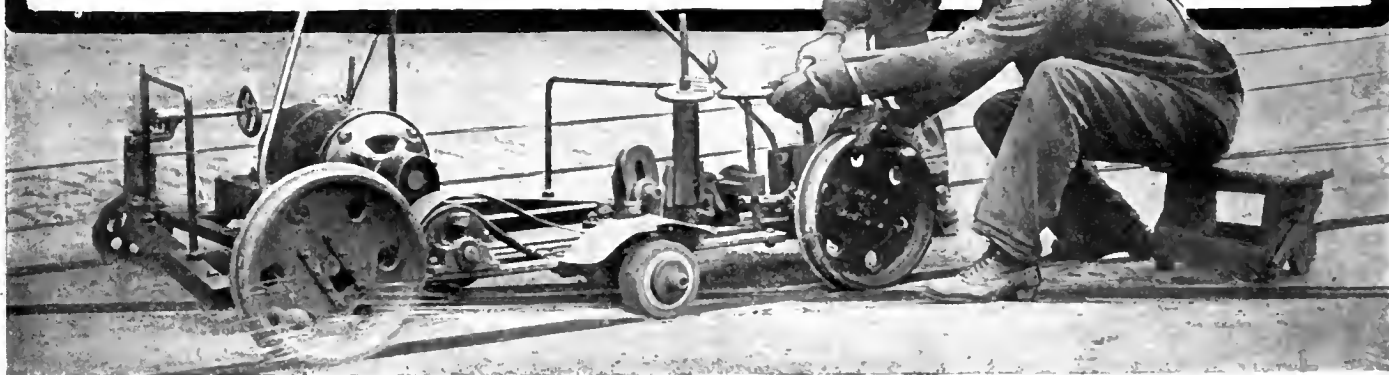


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Electric Furnace Plants  
(912)

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will boost your boiler overload capacity. They will cut fuel consumption. How often is it necessary for you to fire two boilers where the load is but a little over the capacity of one? You can eliminate this uneconomical condition by installing Foster Superheaters. Below are some of the railways that have.

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**"ANTI-PLUVIUS"**  
(Trade Mark)  
**Puttyless Skylights**  
Patented



**THE ROOF  
EFFICIENT**

# It lasts a lifetime

These are the days you want permanence as well as performance in shop equipment. The Drouvé skylight has proved its time wearing quality—it pays because it lasts. Investigate the strength of "ANTI-PLUVIUS" and its fitness for your needs.



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**The G. Drouvé Co., Bridgeport, Conn.**

(180 N. Dearborn St., Chicago)

## RIMCO Rubber Insulated PLIERS

**Protect Your Men  
Against Shocks**

Read the Tag  
—that's all

We are backing this boy and the Government—

**"RIMCO" RUBBER INSULATED PLIER**

This pair tested and passed for 10,000 volts by the Electrical Testing Laboratories of New York City. *July 16, 1917*

CAUTION: "RIMCO" Always use this "RIMCO" Rubber Insulated Pliers, bearing our name and serial number, in material and workmanship. We guarantee all "RIMCO" RUBBER INSULATED METALS CORPORATION Plainfield, N. J., U. S. A. Serial No. 6-5001

**The Rubber Insulated Metals Corporation**

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IT'S THE CONSTANT "LITTLE REPAIRS" THAT BUILD UP BIG MAINTENANCE COSTS

If you will check up on the cost of the work that is being done along your line—not the big replacement and new construction work—but just the little jobs replacing a few rotted crossarms or a few decayed ties, or a bit of fencing, you will probably be surprised to find how much these items total in the course of a year.

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# CYPRESS

"THE WOOD ETERNAL"

not only on new construction, but on all replacement work.

ALL-HEART CYPRESS comes the nearest to being "decay proof" of any lumber suitable for railway use.

Several of the largest railway companies in the country have found the use of Cypress a paying investment.

THEY'VE LEARNED TO INSIST ON SEEING THIS MARK ON EVERY BOARD AND ON EVERY BUNDLE.



The data that substantiates this fact will be promptly furnished, if you ask for it.

## SOUTHERN CYPRESS MFRS' ASS'N

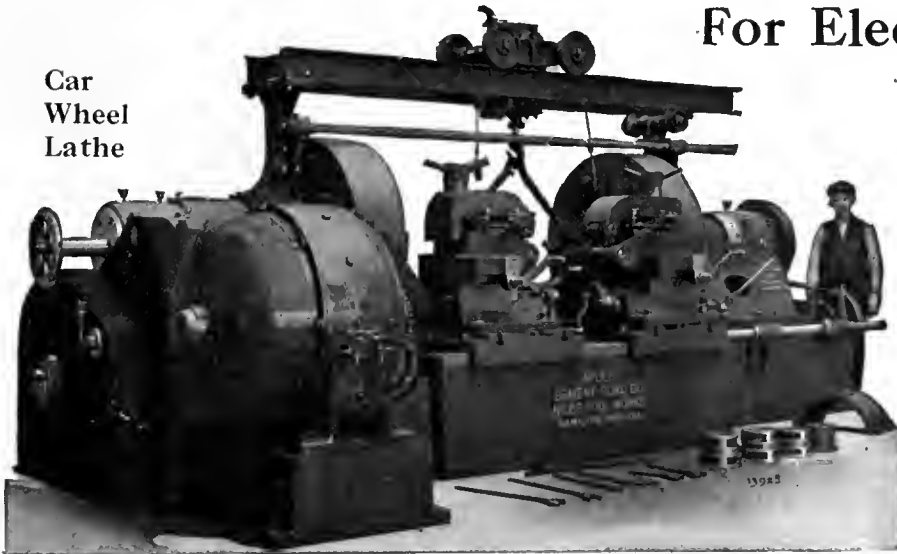
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For Electric Railway  
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They are designed to accommodate coins of any denomination as well as paper or metal tickets.

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Be prepared for any rate of fare by equipping your cars with

### Cleveland Fare Boxes

They take your receipts direct from car rider to counting room. Write us.

### Cleveland Fare Box Co.

Cleveland, Ohio



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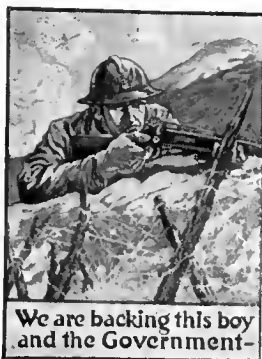
are used on electric rail-  
ways throughout the  
country.



Designed on scientific principles for braking power as well as load car-  
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The chilled tread and flange surface containing three and one-half  
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Prompt Deliveries Assured



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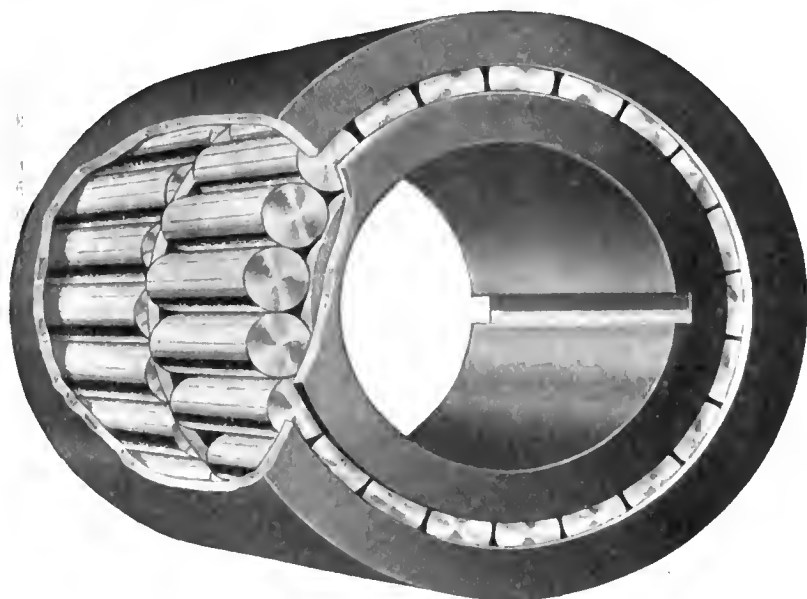
Kansas City

Los Angeles

# **"ROLLWAY" Extra Heavy Duty**

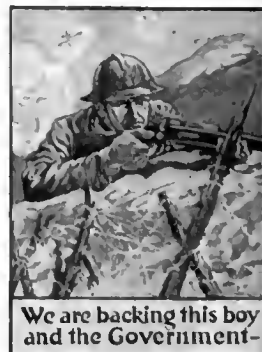
**Rollers of Cromium Alloy**

**Races of Nickel Steel**



"ROLLWAY" BEARINGS  
may be used wherever a bearing  
is necessary. They show up to  
the best advantage under heavy  
loads and high  
speeds, either in  
railway motors  
and car journal  
boxes or in shop  
cranes and hoists.

You are not  
experimenting  
when you buy  
"ROLLWAYS."



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—Representative practice



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And in this equipment should be included the human element, without which no results can be obtained.

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*If you have a problem of any kind pertaining to cars we will gladly co-operate in its solution.*

**St. Louis Car Company**  
St. Louis, Mo.



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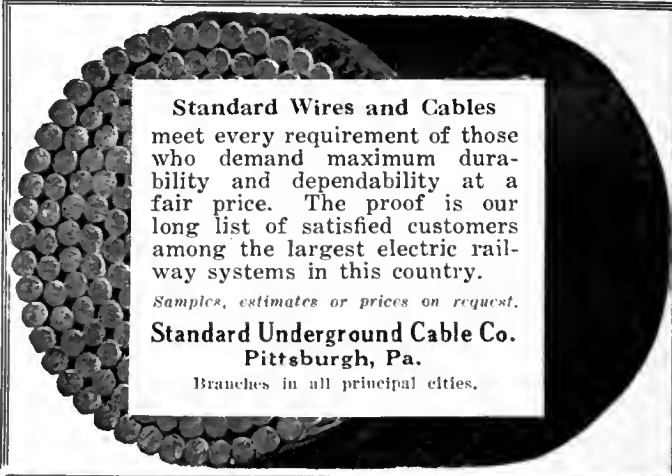
Manufacturers of Aluminum, Ingot, Sheet,  
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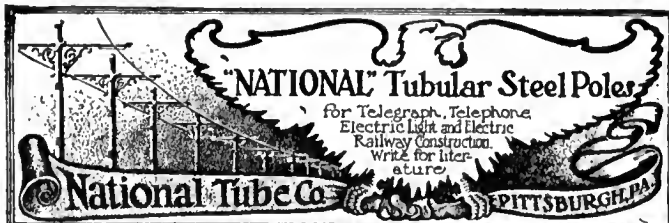
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We make quality goods.

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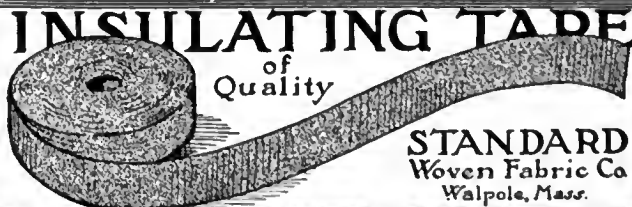
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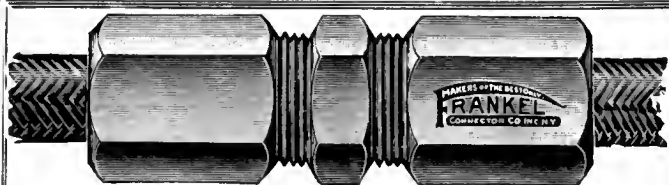
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Tongue Switches, Mates, Frogs, Curves and  
Special Work of all kinds for Street Railways



Quality

STANDARD  
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Patented—Feb. 19, '07;  
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**W**

WESTINGHOUSE  
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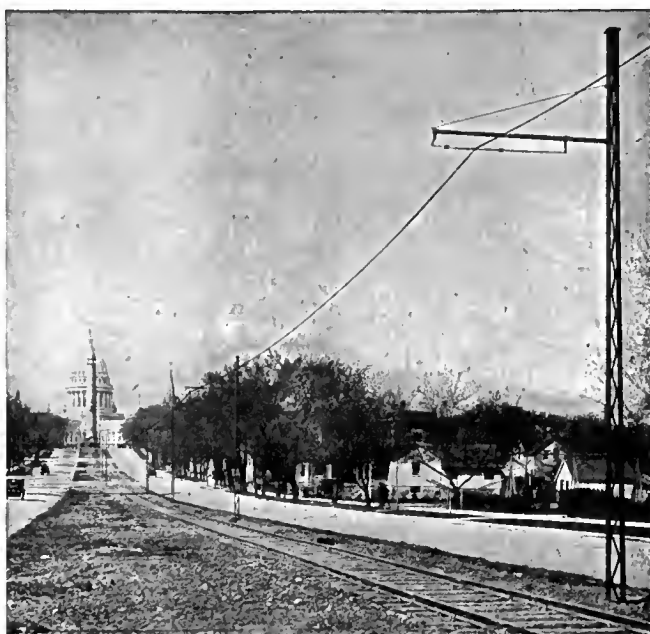
A turn of the nuts grips the cable firmly, making a perfect joint, mechanically and electrically. Can be quickly applied or released. Approved by underwriters.

The FRANKEL line of solderless connectors is complete, suitable for every purpose.

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Sole Agents in the  
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## STEEL POLES For Every Pole Purpose



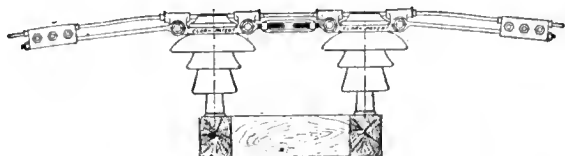
Bates Steel Poles Ornamenting the Approach to the New Wisconsin State Capitol Building, Madison, Wis.

Strongest STEEL POLE of like weight in the world. Best STEEL POLE in the world for electric railway trolley service, Power Transmission or Street Lighting. Most artistic STEEL POLE in the world for any service. We make the lowest prices. We have constantly on hand about two thousand tons of steel and can make immediate shipments. A full line of convenient malleable fittings. Our steel pole *TREATISE* tells a big story. Ask for it.

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give a maximum of protection, as they fasten the conductor efficiently and permanently to the insulator. There are no unbalanced strains, either electrical or mechanical.

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CLARK Seamless Copper Splicing Sleeves.  
CLARK Insulator Clamps.

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MANUFACTURING COMPANY**

[SINGER] BUILDING, NEW YORK



TRUCK WITH TOWER IN RUNNING POSITION

## This 3-Section TRENTON TOWER

is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

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Corrugated Galvanized



**CULVERT**

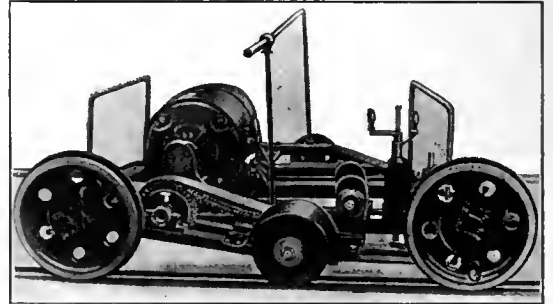
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A large percentage of our orders come from satisfied users who want MORE "ACMES."

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This is the machine *you* will need this spring—  
To *remove* cupped joints, depressions and corrugations in rail, and arc welding surplus.

It is portable; *fast* and grinds to a *smooth* surface; low in price, easy to operate and maintain.

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TRACK SPECIAL WORK



**WE MAKE THIS GRADE ONLY**

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**New York Switch & Crossing Co.**  
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Now Think About It  
We cannot get those Ships  
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This War  
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The Railroads

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**High Grade  
Motor and  
Generator Brushes  
For Railway Equipment**

and for all other types of electrical machinery and are in position to make prompt deliveries.

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saves time, strength and trouble. The many positions to which it is adjustable easily solve perplexing lifting problems. Full details in our catalog. Write for it.

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The subject is one that cannot be dealt with adequately in the limited space of an advertisement.

This booklet explains the causes of Corrosion, Incrustation, Foaming and other troubles, and offers a scientific solution of these difficulties. We believe it will make you realize more fully than you do already, how destructive of boilers and boiler efficiency untreated feed waters may be.

We believe a study of the booklet will also convince you that we are capable of dealing with the proposition in the most effective manner, and we hope that you will fill out the card at the back of the booklet and send to us with a gallon sample of your boiler feed supply for our analysis and proposition.

*Let us have your address and the booklet will be forwarded at once.*

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Insulating Tapes  
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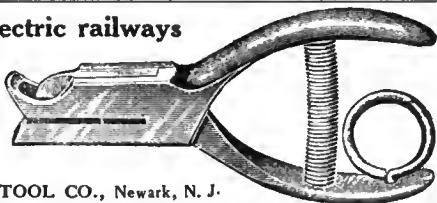
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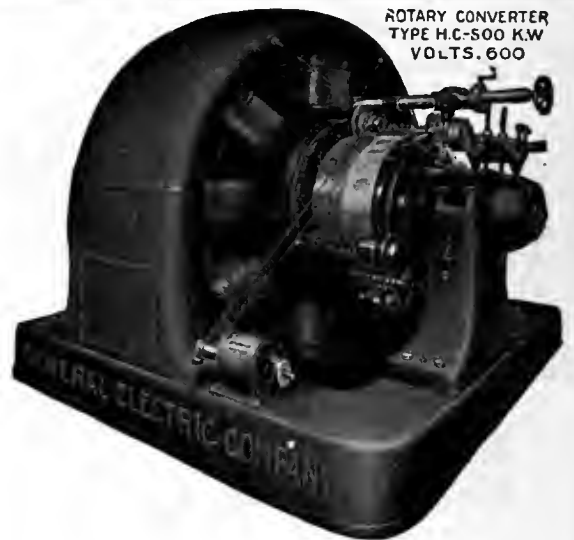
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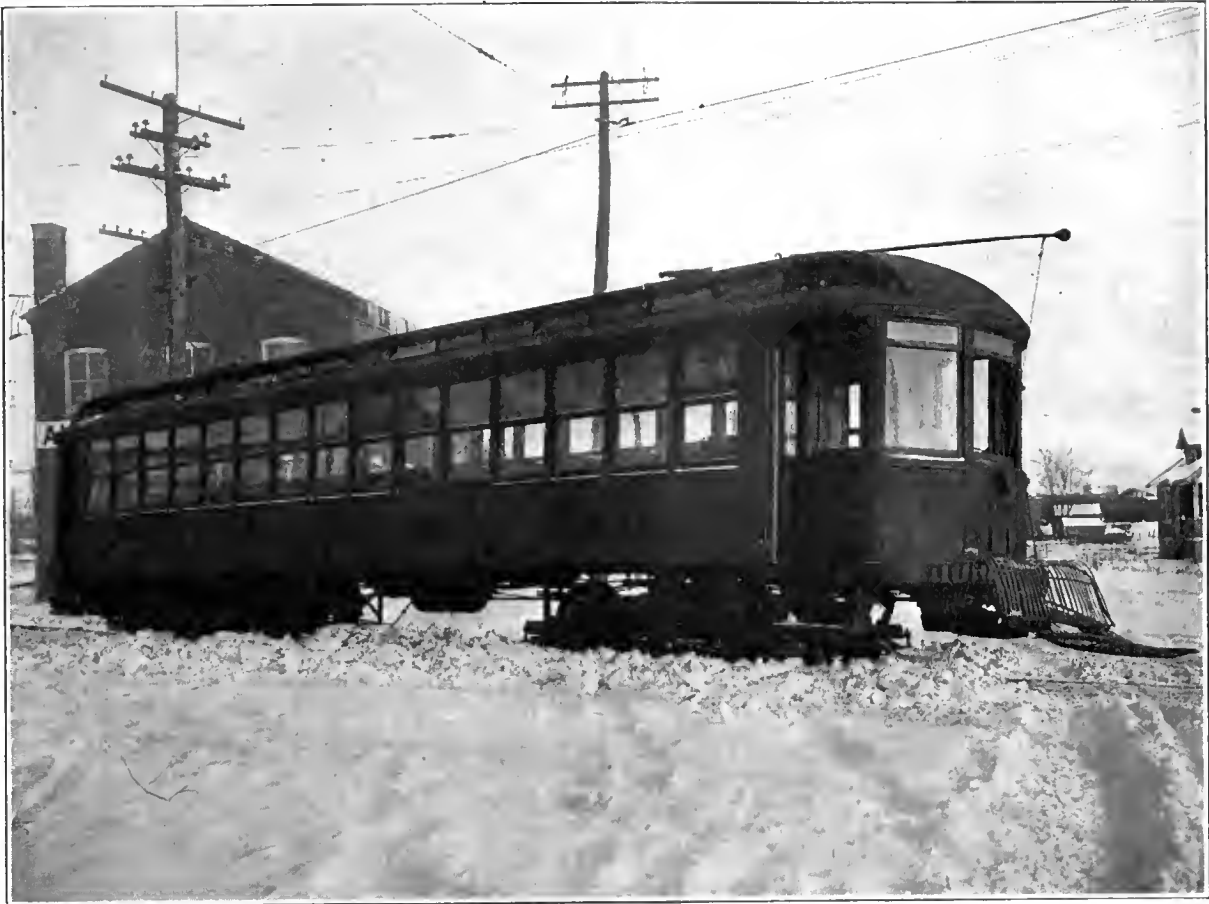
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## FOR SALE INTERURBAN CAR

Length over body, 45' 0".  
 Length over dasher, 52' 0".  
 Length over buffers, 53' 6".  
 Width of panels at sills, 8' 4".  
 Height from top of floor to ceiling, 8' 2 $\frac{3}{8}$ ".  
 Height from bot. of sill to top of roof, 9' 2 $\frac{3}{8}$ ".  
 Height from top of rails to top of roof, 12' 6".  
 Bumpers, angle iron 6" x 3" Brill.  
 Brakes, air and hand, 10" brake cylinder.  
 Draw bars, VanDorn.  
 Fender, Providence.  
 Gongs, 12" dedenda.  
 Headlights, Crouse-Hinds.  
 Roof covering, No. 8 duck, 3 coats of red graphite paint.  
 Trolleys, U. S. No. 6.

Car lines, wood.  
 Trolley catchers, Wilson.  
 Curtains, canvas.  
 Heaters, none.  
 Interior finish, natural wood finish.  
 Seats, Wheeler.  
 Trucks, Brill No. 27-A, 31' centers.  
 Axles, Midvale heat treated, 5" dia., gear seat 6".  
 Wheel base, 72".  
 Wheels, 34".  
 Gauge, 4' 8 $\frac{1}{2}$ ".  
 Controllers, 2 G. E. K-14.  
 Motors, 4 G. E. 57-2 turn.  
 Gear teeth, 63—Grade M.  
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- 1—5000 KW. Gen. Elec. Curtis Turbo Generating Set, 3 ph., 60 cy., 13,200 V., 720 RPM., with condenser, 175 lb. steam pressure.
- 1—2500 KVA. Gen. Elec. Curtis Horiz. Turbo Outfit, 2 ph., 60 cy., 2300 V., 3600 RPM., 150 lb. steam pressure, with Westg.-Le Blanc Condenser.
- 1—2250 KW. Curtis Vertical Turbine Outfit, 3 ph., 60 cy., 2300 V., 900 RPM., 160 lb. steam pressure, with Blake Jet Condenser.
- 1—1500 KW. Gen. Elec. Curtis Turbo Outfit, 3 ph., 60 cy., 2300 V., 900 RPM., 157 lb. steam pressure, with Wheeler Condenser.
- 1—500 KW. Gen. Elec. Curtis Turbo Outfit, 3 ph., 60 cy., 2300 V., 1800 RPM., 150 lb. steam pressure. Vertical type.
- 1—500 KW. Westg. Horiz., 3 ph., 60 cy., 360 V., 3600 RPM. Turbo Outfit.
- 1—100 KW. Gen. Elec. Turbo Outfit, 3 ph., 60 cy., 2300 V., 3600 RPM., 125 lb. steam pressure.

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- 4—250 HP. Heine Boilers at 175 lb. steam pressure.

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- 2—500 KW., 25 cy., 600 volt Rotaries, 500 RPM., with 3—240 KW. and 3—200 KW., 25 cy. Transformers of Westg. make.
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- 1—300 KW. Westg., 3 ph., 60 cy., 600 V., 720 RPM., with 3—110 KVA. Westg. Transformers.
- 3—300 KW. Gen. Elec., 60 cy., 600 V., 900 RPM. Rotaries, each with three General Electric Transformers.
- 1—150 KVA., 60 cy. Gen. Elec., 600 volt, 1200 RPM., with 3—Gen. Elec., 55 KW. Transformers.
- 1—200 KVA. Gen. Elec., 60 cy., 600 V., 1200 RPM., with 3—75 KW. Gen. Elec. Transformers.

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- 1—500 KW. Motor Generator Set, consisting of 1—500 KW., 3 ph., 60 cy., 2200 volt Synchronous Motor (720 HP.) and 1—500 KW., 275 volt, 900 RPM. DYNAMO with 7 KW., 125 volt dir. ctd. Exciter.

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- 3—750 KW. Gen. Elec. O. I. S. C., 2200/4400 V. prim., 281/488 V. secy.
- 2—550 KW. Westg. single phase O. I. S. C., 2300 V. prim., 185/92.5 V. secy.
- 4—500 KW. Westg., 11,000 V. prim., 2500 V. secy. All interchangeable for Scott connection, 11,000 volts, 3 ph. to 2300 volts, 2 ph.
- 3—500 KVA. Westg. O. I. S. C., 25,400/44,000 V. prim., 13,800 V. secy.
- 1—250 KW. Gen. Elec., 6200 V. prim., 460 V. secy.
- 1—200 KW. Gen. Elec., 20,000/34,600 V. prim., 460 V. secy.
- 3—200 KVA. Gen. Elec., air blast type, single ph., 2200 V. prim., 370 V. secy.
- 2—200 KVA. Gen. Elec., single ph., 9200 V. prim., 460 V. secy.
- 6—185 KVA. Westg. O. I. S. C., single ph., 2200 V. prim., 155 V. secy.
- 3—175 KW. Stanley, single ph., 6600 V. prim., 440 V. secy.
- 4—150 KW. Gen. Elec., single ph., 5000 V. prim., 2200/2420 V. secy.
- 3—150 KVA. Bullock, single ph., 2180/2300/2420 V. prim., 440 V. secy.
- 1—100 KW. Gen. Elec., single ph., 9200 V. prim., 2300 V. secy.
- 3—75 KW. Allis-Chal., single ph., 11,000 & 2200 V. prim., 250/275/300 V. secy.
- 7—75 KW. Gen. Elec., single ph., 5000 V. prim., 2200/2310/2420 V. secy.

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25 CYCLE

- 4—500 KW. General Electric Rotary Converters, type HC, 3 phase, 4 pole, 750 R.P.M., 600 Volts D.C., with
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- 1—500 KW. Westinghouse Rotary Converter, 3 phase, 6 pole, 550 R.P.M., 550 volts D.C., 390 volts A.C., with
- 3—175 KW. Westinghouse single phase transformers, 13,200 volts primary, 390 volts secondary, oil cooled. Switchboard complete.
- 1—300 KW. National Rotary Converter, type RT, 3 phase, 6 pole, 550 volts D.C., 330 volts A.C., 500 R.P.M. Switchboard complete.
- 1—300 KW. Stanley Rotary Converter, SKC, 3 phase, 6 pole, 600 volts D.C., 366 volts A.C., 500 R.P.M.
- 1—250 KW. General Electric Rotary Converter, type TC, 3 phase, 4 pole, 550 volts D.C., 350 volts A.C., 750 R.P.M.

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**3—200 K.W., 25 Cycle Westinghouse Transformers, 22,000 to 361 volts.**

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These transformers in use about 8 years. In first-class, perfect condition.

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- 1—20 x 42 Harris Corliss Engine. Brown valve gear, two eccentrics, flywheel 14' x 31" face, crank shaft 11" dia. with 54" disc. Rated H.P. 333 at 150 lbs. steam, rev. 100.
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- 1—150 H.P. Heater.
- 1—220 K.W. 2400 volt, 66 cycle, 8000 alt., Stanley G. I. Generator, 3 bearing with pulley 24" x 31" face, regulator panel on generator. This machine is two phase and has a speed of 666 rev. P. M.
- 1—3 K.W. Exciter, 125 volts, 24 amp., speed 1350, Stanley G. I. Pulley, 9 x 5½" face.
- 1—220 K.W. 2400 volts, 66 cycle, 8000 alt., Stanley G. I. Generator, 2 bearings with pulley 24" x 25" face, regulator panel on generator. This machine is two phase and has a speed of 666 R.P.M. Also a Northern

Exciter that goes with this machine, a 24" endless belt, double, about 84" long, one wood pulley 84" x 37" face

- 1—38" Double belt laced, about 107 ft. long.
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- 1—5" Shaft 13 ft. long.
- 1—82" Pulley with 25" face.
- 2—8" Valves with 1" by-pass.
- 2—10" Valves with 1" by-pass.

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- 1—Westinghouse A.C. Belted Generator, 75 K.W., 220 V., 19.7 Amps. per terminal, 3 phase, 7200 alt., 720 R.P.M., 20" Pulley, 18" face.
- 1—Westinghouse D.C. Belted Generator, 1.5 K.W., 125 V., 12 Amps., 1300 R.P.M.
- 1—Ames Engine, 14" x 12" and 240 R.P.M., 60" pulleys, 13" face. Rated at 125 H.P.
- 1—Dean 2 Cylinder Steam Feed Pump, size 6 x 4 x 6.
- 1—Nat'l Feed Water Heater, size 30B.
- 2—72"x18" Hodge Boilers with 92 tubes.
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500 tons 100 lbs. with angles. **New.**

**Full stock all weights.**

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All equipped with G. E. No. 80 motors, 550-600 volts.

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ELECTRICAL foreman wanted; experienced man for overhead line work; must be experienced on arc and high and low tension A.C. and able to lay out new extensions. In reply state experience and salary desired. P-77, Elec. Ry. Journal, Philadelphia.

ELECTRICAL engineer wanted; experienced man on overhead and underground A. C. high and low tension distribution systems. State experience and salary desired. P-78, Elec. Ry. Journal, Philadelphia.

FIRST-CLASS storekeeper wanted. Machine shop experience preferred. Write, giving full particulars, experience, salary desired and give references. Application considered strictly confidential. Ingle Machine Co., 371-381 St. Paul St., Rochester, N. Y.

GENERAL foreman or assistant master mechanic wanted, capable of handling men, by a street railway company in New England, experienced in surface car inspections and repairs. Good salary. Permanent position to right man. P-53, Elec. Ry. Journal.

GOOD, sober, skilled electric car repairman wanted. Good wages to the right sort. P-81, Elec. Ry. Journal, Philadelphia.

SUPERINTENDENT wanted for single track, high speed line. Must be familiar with standard operating methods and transportation details; also a competent executive, capable of handling men and producing results. Give details of experience, references and salary expected. P-76, Elec. Ry. Journal.

TRAVELING auditor familiar with railway and electric accounts wanted; state age, experience and salary desired. P-86, Elec. Ry. Journal, Philadelphia.

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ASSISTANT superintendent or despatcher of transportation department by man with 22 years' experience in transportation work. Good organizer. PW-74, Elec. Ry. Journal, Chicago.

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ELECTRICAL engineer. Railway specialist can be engaged for temporary or permanent connection. Reports made for engineering firms or operating systems. Examination of traffic, schedules and car equipment with particular reference to power and other economies. PW-79, Elec. Ry. Journal.

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POSITION as master mechanic wanted by man with experience both city and interurban. Can furnish best of reference. PW-87, Elec. Ry. Journal, Cleveland.

SUPERINTENDENT for city and interurban railway seeks field for larger service. Have no desire to change except for greater achievement. At present connected with operators of large interests. Conference or correspondence confidential. PW-66, Elec. Ry. Journal, Chicago.

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60 ft. lengths, fair condition.

F. S.-84, Elec. Ry. Journal

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Collier, Inc., Barron G.

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Berne Mfg. Co.

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Holden & White, Inc.

## Alloys, Steel & Iron.

(See also Bearings & Bearing Metals.)

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Electric Service Supplies Co.  
Holden & White, Inc.  
Johns-Manville Co., H. W.  
Ohio Brass Co.  
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Carnegie Steel Co.  
Laclede Steel Co.  
National Railway Appliance Co.  
St. Louis Car Co.  
Standard Steel Works Co.  
Taylor Electric Truck Co.  
Westinghouse Elec. & M. Co.

## Shutting Devices.

Columbia M. W. & M. I. Co.

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American Railway Supply Co.  
Electric Service Supplies Co.  
International Register Co., The  
Western Electric Co.

## Bankers & Brokers.

Coal & Iron National Bank.

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Johns-Manville Co., H. W.  
Western Electric Co.

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Western Electric Co.

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Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
General Electric Co.  
Kerschner Co., Inc., W. R.  
More-Jones Brass & Metal Co.  
St. Louis Car Co.  
Taylor Electric Truck Co.  
Westinghouse Elec. & M. Co.

## Bearings, Center and Roller Side.

Baldwin Locomotive Works.  
Holden & White, Inc.  
Stuckl Co., A.

## Bearings, Oilless, Graphite, Bronze & Wood.

Bound Brook Oil-less Bearing Co.

## Bearings, Roller and Ball.

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Railway Roller Bearing Co.  
SKF Ball Bearing Co.

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St. Louis Car Co.  
Western Electric Co.

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Niles-Bement-Pond Co.  
Western Electric Co.  
Zelnicker Sup. Co., W. A.

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Babcock & Wilcox Co.

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Johns-Manville Co., H. W.

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Johns-Manville Co., H. W.

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Roller-Smith Co.

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Imperial Brass Mfg. Co.  
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St. Louis Car Co.  
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Western Electric Co.  
Zelnicker Supply Co., W. A.

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Jeandron, W. J.  
Morgan Crucible Co.  
United States Graphite Co.  
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Beaumont Co., R. H.

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Beaumont Co., R. H.

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## Bushings, Graphite and Wooden.

Bound Brook Oil-less Bearing Co.

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Southern Cypress Mfrs. Assn.  
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Western Electric Co.**Poles, Trolley.**Anderson M. Co., A. & J. M.  
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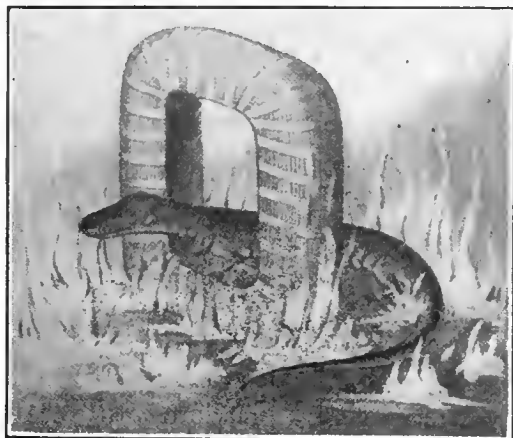
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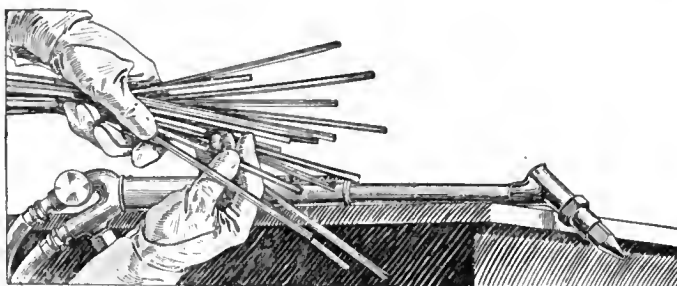
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Just a reminder that Uncle Sam will gladly pay you \$5.00 for every \$4.14 saved this month.

# Rails To-day

are

## \$102.<sup>00</sup>



We purchased steel rails less than two years ago at \$31.50. The present figure is \$102, and while small quantities could recently be purchased for comparatively short delivery, large quantities are quoted for delivery in eighteen months to two years.

# To-Morrow

## ? ? ?

The above item was clipped from an article by a Purchasing Agent.

Today he may get steel rails for \$102. Tomorrow he may have to pay \$200—and consider himself lucky to get them at all!

How about specifying Titanium treatment for your new rails—it will ease your mind later on—when other people have to **renew** their rails at prohibitive prices, while your Titanium-treated rails stand the wear and tear so well that renewals are greatly reduced.

Ask us about this.

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# SKF

for  
Street Railway  
Motors

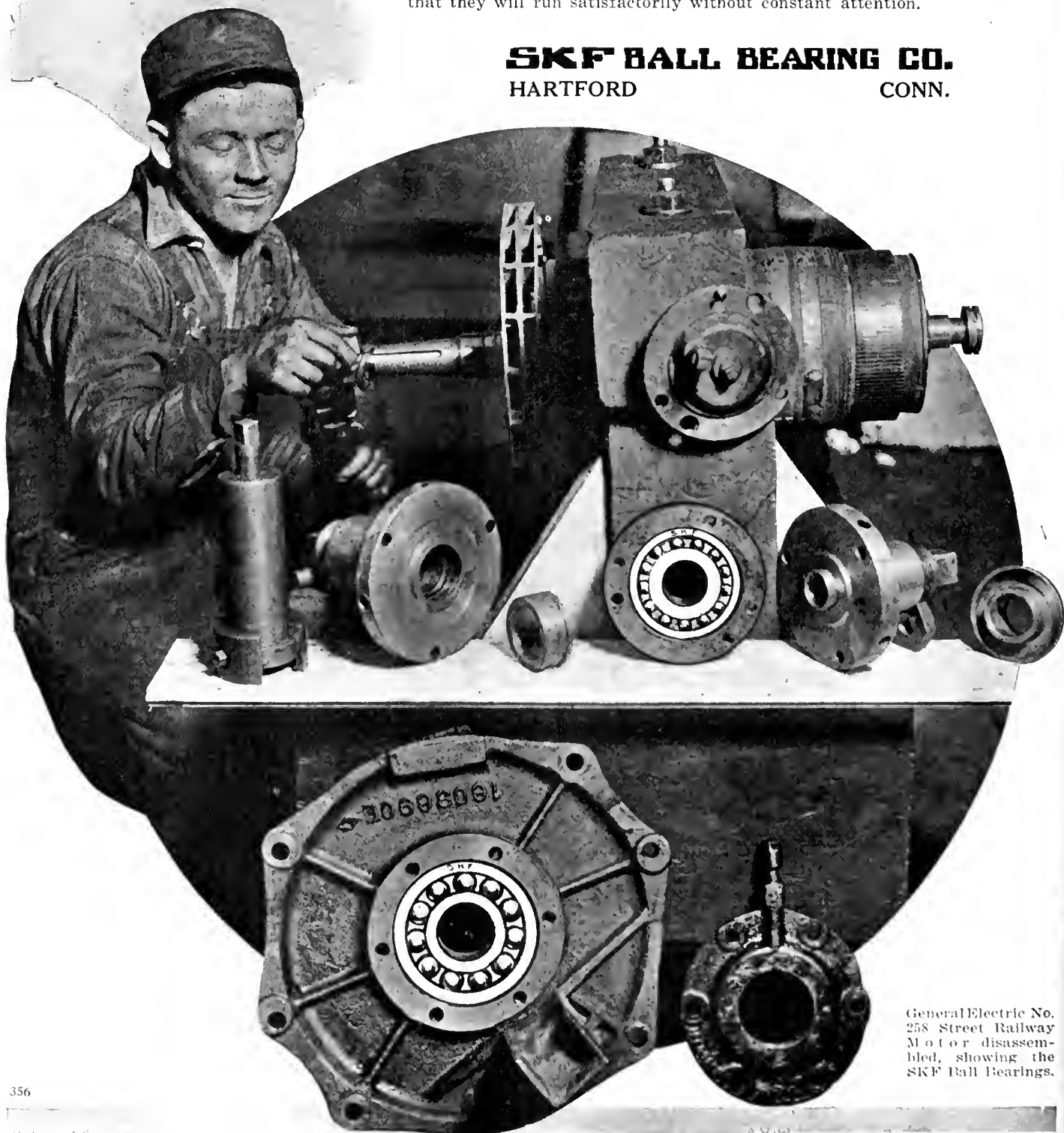
## The Light Weight Ball Bearing Equipped Motor

The light weight street railway motor equipped with ball bearings marked SKF eliminates unnecessary weight in truck construction and consequently reduces the initial cost.

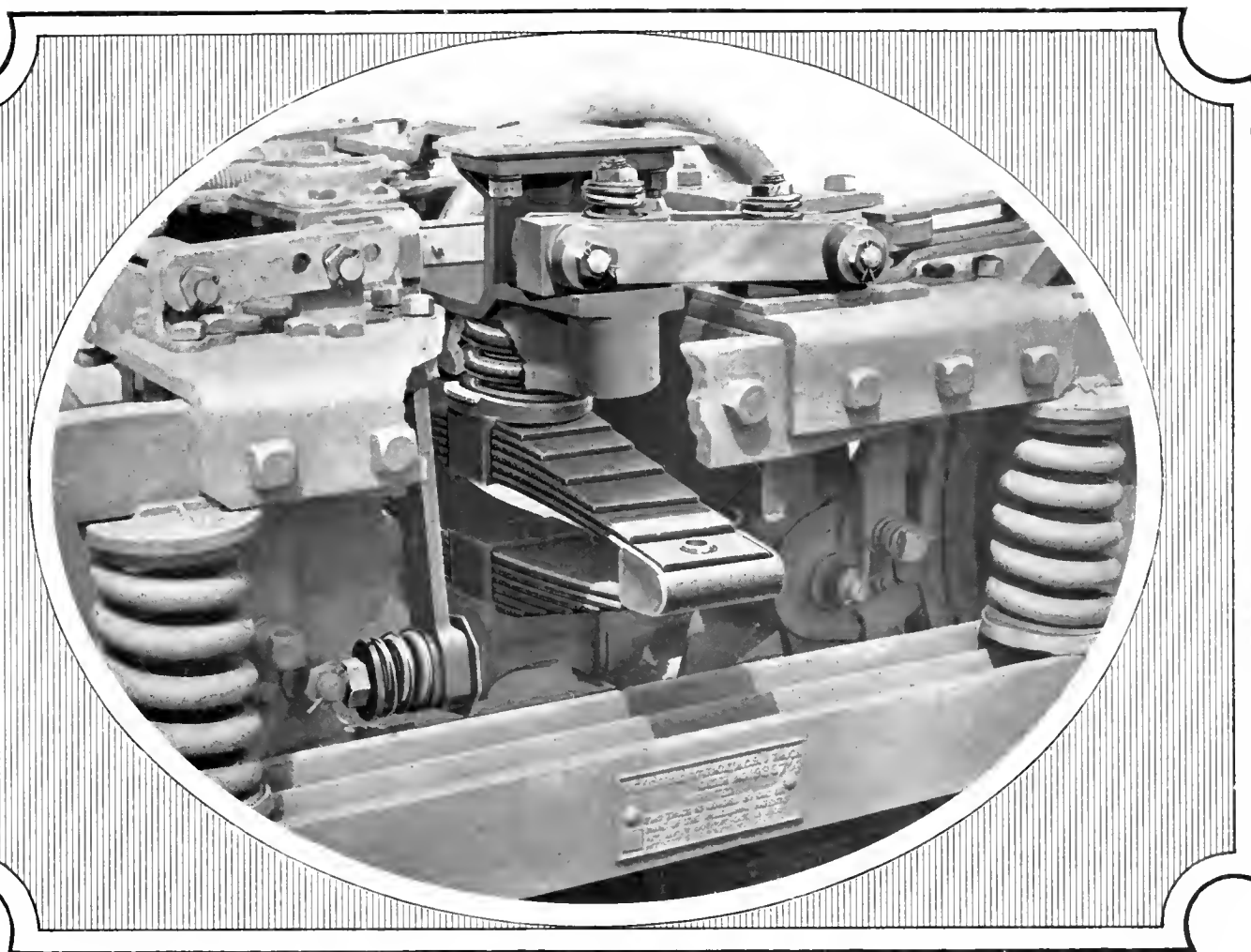
90% of the necessary repairs to Street Railway motors are caused through the wear of plain bearings, with the result that the centers of the gears and pinions alter, causing stripping of the teeth. By equipping with SKF not only are these difficulties overcome but the overall dimensions of the motor can be reduced from 10 to 20%.

If your street railway motors are SKF equipped you can get 40 to 50 thousand miles without re-lubricating your motors and have the assurance that they will run satisfactorily without constant attention.

**SKF BALL BEARING CO.**  
HARTFORD CONN.



General Electric No. 258 Street Railway Motor disassembled, showing the SKF Ball Bearings.



## A Trio of Truck Improvements

The illustration is of the middle of the Brill standard interurban truck with a part of the solid forged side frame broken away to show the end of the one-piece cast steel bolster and how it is mounted on an extra set of spiral springs, one on top of each elliptic. This is the Graduated Spring System that perfectly cushions the car body when lightly loaded; that is, when carrying no more than a seated load. Note the link device, called the Bolster Guide, that holds the bolster exactly in its right position and allows it to float with a frictionless motion on the springs. The Graduated Spring System and Bolster Guide are regular parts of all the Brill standard pivotal trucks. Note, too, the Side-swing Dampener, a spring friction arrangement at the bottom of the swing link that prevents the car body from swaying. These three important features are the subjects of Bulletin 222—write for it.

THE J. G. BRILL COMPANY  
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# Carrying New York's Millions on the Interborough

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The engineering and manufacturing resources of the General Electric Company have always responded to the rapidly progressing requirements.

In 1901 the Manhattan Elevated was electrified using the GE-66 motor and Sprague-General Electric type M control—this equipment

being selected because of its great capacity and light weight.

In 1907 the Interborough Company placed in service its first large commutating pole motors—the GE-212.

In 1915 they adopted the GE-260 ventilated railway motor and were the first to adopt the modern method of automatic operation known as the Sprague-General Electric—type P-C control.



## General Electric Company

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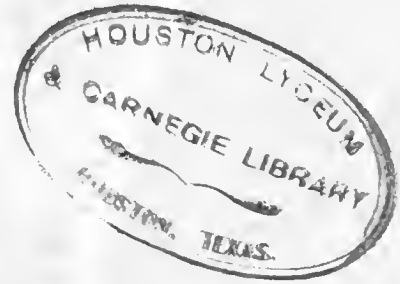
in all large cities



Latest Commercial Electric Locomotives

# ELECTRIC RAILWAY JOURNAL

March 23, 1918 McGraw-Hill Company, Inc.



*"Gentlemen, Our Annual Saving  
will be close to \$40 per Car!"*



The above is based on the finding of the engineers of a prominent electric railway, investigating Utility Heater-Regulators. The report was rendered when coal was less than two-thirds its present price. The road equipped its cars and is now understood to be saving more than \$50,000 a year.

Railway Utility Co., Chicago



## Freight Handling Indorsed

At a meeting of the transportation committee of the City Council of Chicago on February 8th, representatives of Chicago industries heartily indorsed the proposed plan permitting surface and elevated lines in Chicago to carry light freight and express matter.

All agreed that it would be a great help in relieving steam roads of a portion of short-haul freight. It was also stated that the Chicago lines could make connections that would put them in touch with about 500 miles of track in the surrounding territory.

It was the general opinion that, with reasonable rates, the tendency would be to lower the prices of certain classes of merchandise in Chicago.

Address either company for particulars as to freight haulage.

**The Baldwin Locomotive Works**  
Philadelphia, Pa.

**Westinghouse Electric & Mfg. Co.**  
East Pittsburgh, Pa.

# Electric Railway Journal

H. W. BLAKE, Editor

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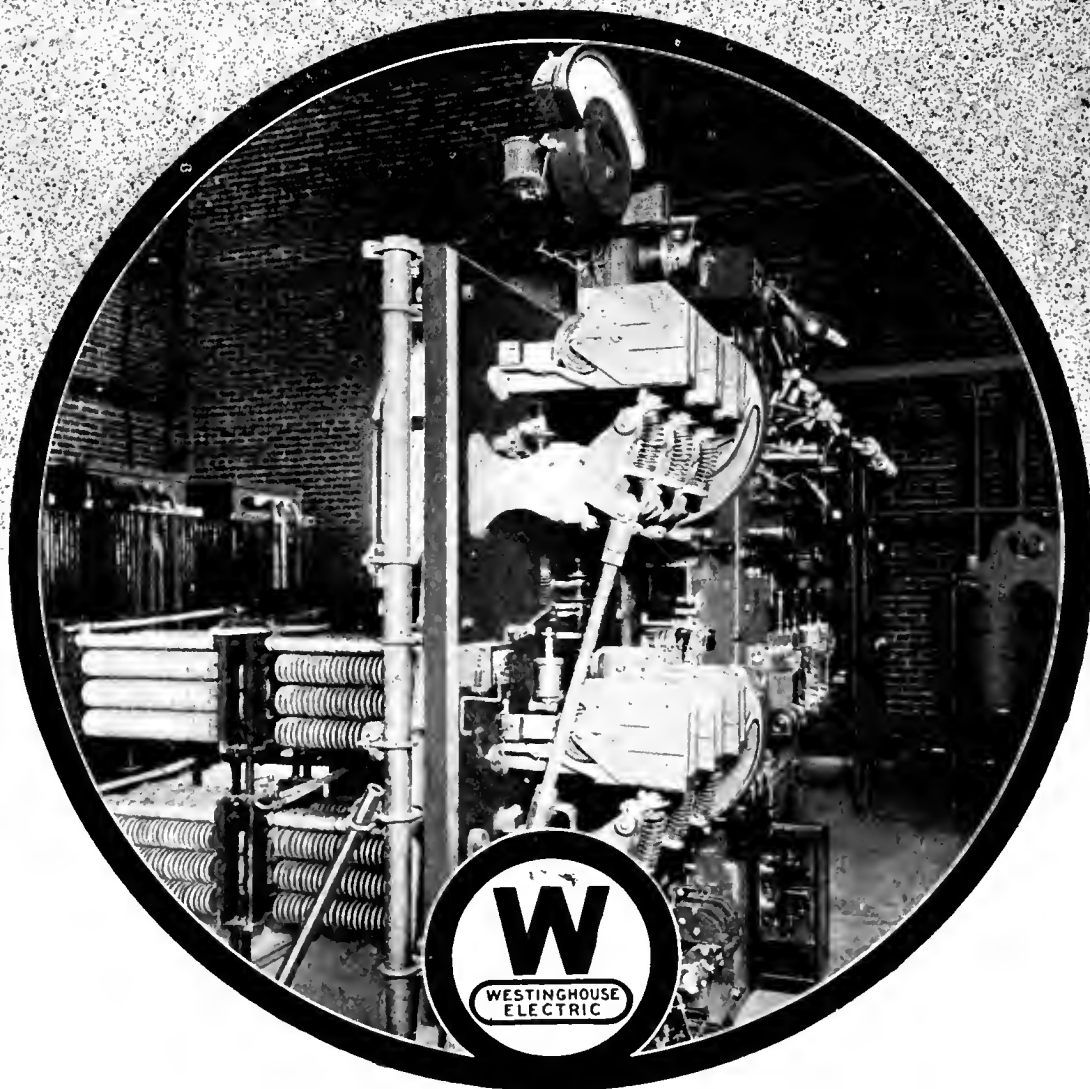
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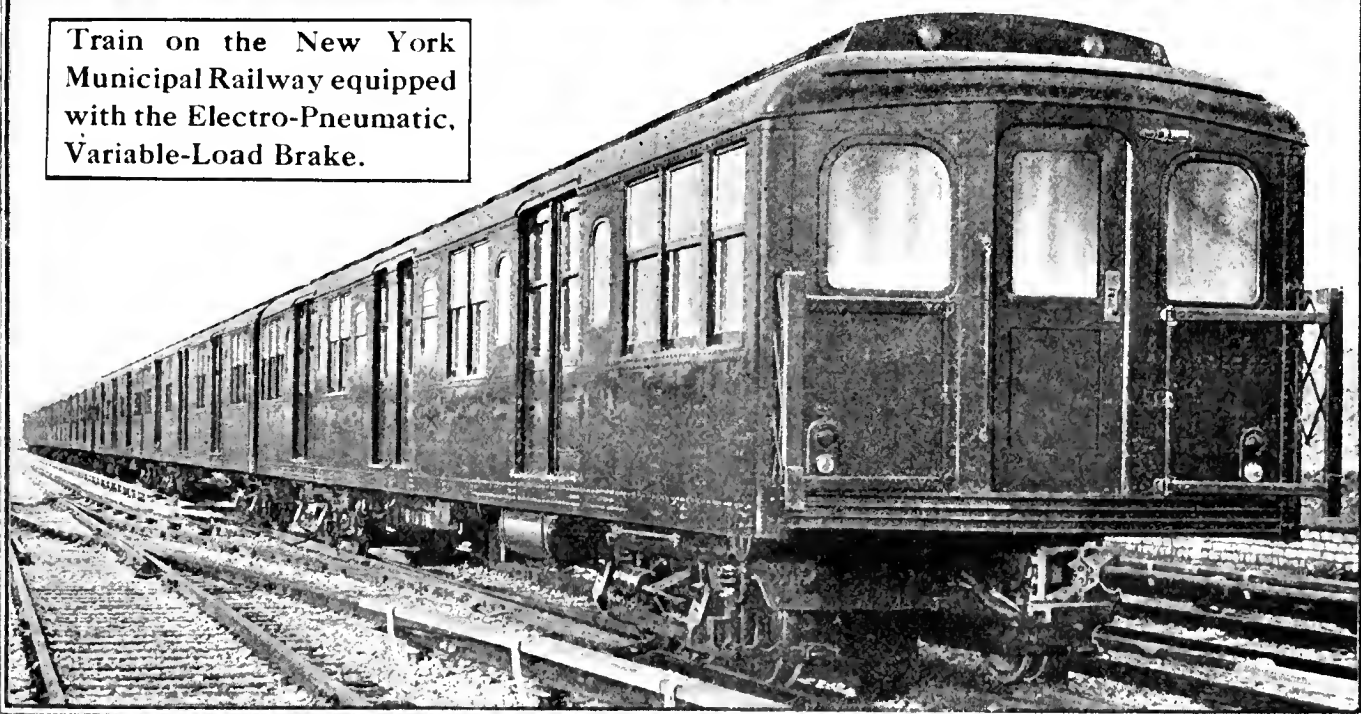
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Train on the New York Municipal Railway equipped with the Electro-Pneumatic, Variable-Load Brake.



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*For  
Sturdy  
Service*



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Installed in 1906.

50 ft. Northern White Cedar Poles.

Supporting this load:

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500 volt D.C. power circuit, 2—300,000 c.m. cables.					
500 volt railway feeders . . . . .	<table border="0"> <tr> <td>1—4/0 cable</td> </tr> <tr> <td>4—300,000 c.m. cable</td> </tr> <tr> <td>1—600,000 c.m. cable</td> </tr> <tr> <td>1—1,000,000 c.m. cable</td> </tr> </table>	1—4/0 cable	4—300,000 c.m. cable	1—600,000 c.m. cable	1—1,000,000 c.m. cable
1—4/0 cable					
4—300,000 c.m. cable					
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End View—Single Trolley



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at  
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from 1908  
to Date



Main Street, Broadway, Spring Street and Seventh Street are among the busy Los Angeles thoroughfares guaranteed uninterrupted current collection by means of Phono-Electric trolley wire.

Take Main Street, for example. Its  $\frac{3}{4}$  mile of No. 000 Phono-Electric between Temple Block and Twelfth Street, takes care of both Los Angeles city cars and Pacific Electric suburban and interurban trains.

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**Bridgeport Brass Company**  
Bridgeport Connecticut

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### Make That Schedule Easy

200 cubic yards of concrete is being mixed and placed in 10 hours by a gang of twenty-five men on a number of street railway properties. With 800 cubic yards of concrete to the mile of steel twin tie track below the rail base, this gang will concrete completely 1320 ft. of track in 10 hours.

Steel twin ties in a seven-foot trench and with seven inches of concrete in bearing below the tie plate require less than 800 cubic yards per mile of track. That's why you can speed up the job to 132 ft. of track per working hour. Less equipment and fewer men would not move so fast, but the ratio of progress would remain the same.

In addition, the excavation is reduced 50% and the number of ties to handle 66%. These also mean labor saving. And your track is out of service for a shorter period.

Ask the users of steel twin ties if you want to check these facts.

A stock of low-priced steel in hand insures a "rock bottom" price and prompt delivery. Order now and you'll be a regular user next year.

*Prompt deliveries made from stock*



Permanent Track at Less Cost  
Any Type Base — Open or Paved Track

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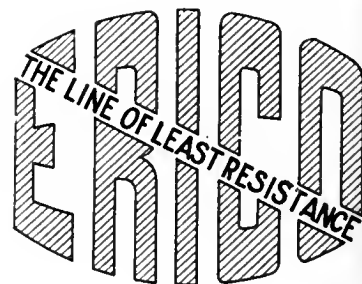
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## Schedules Are Maintained

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The Erico Portable Welding Outfit is gaining in value every day, as labor shortage becomes more evident.

Full information on request.

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Score a bull's-eye for better public relations.

Increase your patronage.

Decrease lighting costs.

Eliminate broken glassware and the consequent damage claims.

You can do this by installing

## "Safety" Car Lighting Fixtures

"Safety" Car Lighting Fixtures are specially designed for Railway use. They will not rattle in the holder; are free from loose screws, springs or other intricate parts; they hold the reflector primarily by flexible fingers so that the reflector cannot possibly break or fall, and they necessitate only one-hand operation to remove and replace the reflector.

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Your patrons will quickly appreciate the improved car lighting made possible by these fixtures. Well lighted cars make more money.

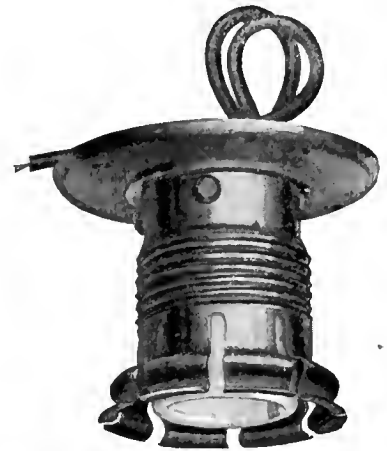
*Write for special booklet.*

### ELECTRIC SERVICE SUPPLIES Co.

*Manufacturer of Railway Material  
and Electrical Supplies*

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"Safety" Fixture, with clamping sleeve removed, showing flexible fingers which are sufficiently rigid to hold the reflector until the clamping sleeve is screwed down in place.



Bracket Type



Straight Pendant Type  
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# Save Power for Car Propulsion and Heating by using National Pneumatic Door and Step Control

¶ It is well known that if the length of stop is shortened, the motorman has more time left for **coasting** or running with power off.

¶ National Pneumatic door engines permit this saving in energy consumption because the doors are opened and closed more quickly than is possible by hand.

¶ That air-operated doors also save power for car heating is brought out by Mr. J. J. Dempsey, vice-president Brooklyn Rapid Transit System, who writes in the January, 1918, issue of the *B. R. T. Monthly*:

¶ "The operation of New York Municipal trains without heat requires 4 k.w.-hours per car mile. With three points of heat— $5\frac{1}{2}$  and 6 k.w.-hours per car mile. **Thus the heating of a car requires 30 per cent of the power required to operate it.**

¶ "Obviously, then it is the duty of every conductor to keep in mind the amount of energy wasted in the opening and closing of doors. **With due care in this regard alone, a proper temperature could be maintained in the cars on from one-third to one-half less power.**"

¶ *Two hundred and fifty New York Municipal Railway cars have push-button-controlled*

**National Pneumatic Engines**

**NATIONAL PNEUMATIC COMPANY**

INC.

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# A Great Saving in Power →

This recorder has shown in its service on more than 1200 cars that it can help to produce tremendous savings in consumption of energy.



## The Arthur Power-Saving Recorder

is now being marketed with an additional feature which insures even greater savings.



### This Added Feature

possesses the important advantage of checking the motorman's operation of

#### the controller

while retaining all the values which come from checking his operation of

#### the brakes

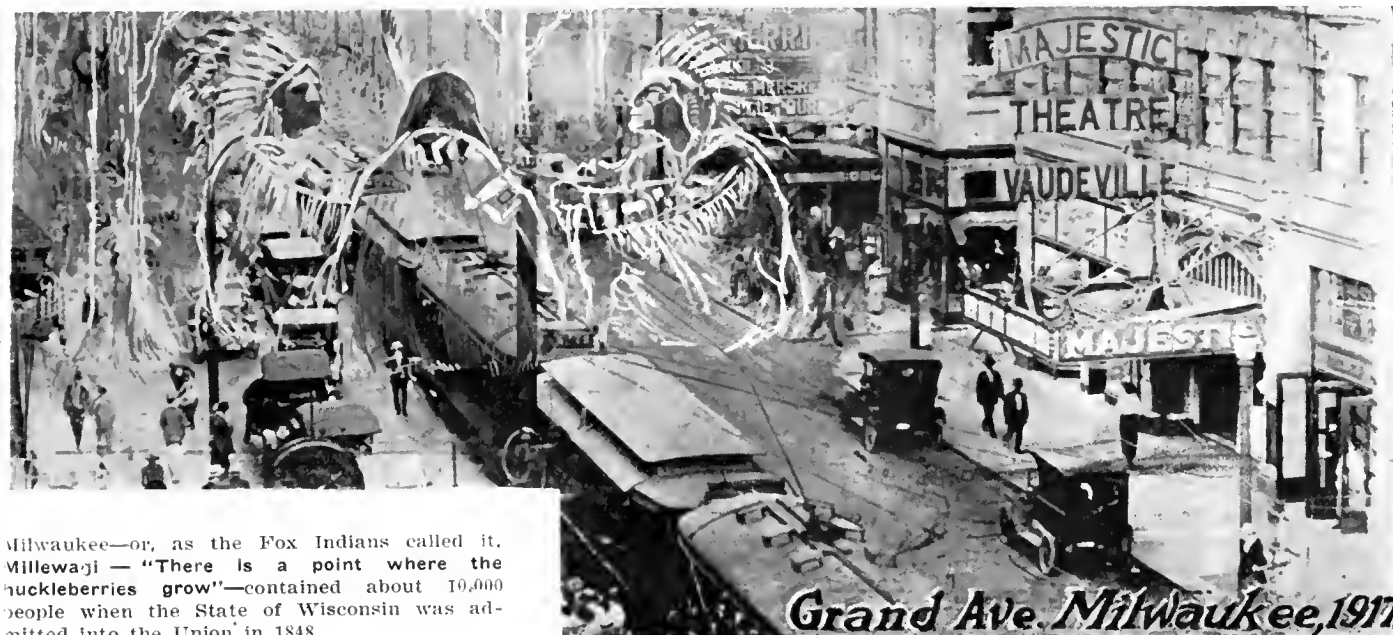
Requires no live wires—no fuses—no shunts—no resistances—no switches.

Do you see the enormous possibilities which this presents in educating your car crews to the best methods of safe operation and the minimum consumption of power? Write us for detailed information.

**The Arthur Power-Saving Recorder Co.**

Second National Bank Building, New Haven, Conn.

*"Power wasted is the true measure of the motormen's relative efficiency"*



Milwaukee—or, as the Fox Indians called it, Millewaji — “There is a point where the huckleberries grow”—contained about 10,000 people when the State of Wisconsin was admitted into the Union in 1848.

## Telegraph Wires Reached Milwaukee

in 1849, but it was not until seven years later that a railroad train from Chicago entered the city.

Because of the importance of this city as a trading center, and distributing point for the ore, lumber and flour products of Wisconsin, its transportation facilities are far in excess of those of other cities of similar size. In addition to four trunk

railroad lines and a dozen lines of lake steamboats, the city boasts of one of the finest suburban and interurban electric railway systems in the world, with 405 miles of track, 643 motor cars and 113 trailers. Direct rapid transit with Chicago (82 miles away) is maintained with heavy, high-speed cars by way of Racine, Kenosha, Waukegan and Evanston.

In this type of service

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and Galena service are of inestimable value to the electric railway companies. Lubrication problems which confront the maintenance department may be put squarely up to us. We do not merely sell oil, but make it our business to study your particular lubrication questions, and to co-operate with you in finding a satisfactory answer.

We have done this work for half a century. How well it has been done the record shows.

**Galena-Signal Oil Co.**  
Franklin, Pa.



# Just Off the Press

## McGRAW ELECTRIC RAILWAY LIST

*February, 1918*

Published Semi-Annually  
in Connection with the

**McGraw Electrical Trade Directory**  
[Railway Edition]

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**Subscription Price \$5.00 per Year**  
**Single Copies \$3.00**

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**McGraw-Hill Company, Inc.**  
10th Avenue at 36th Street  
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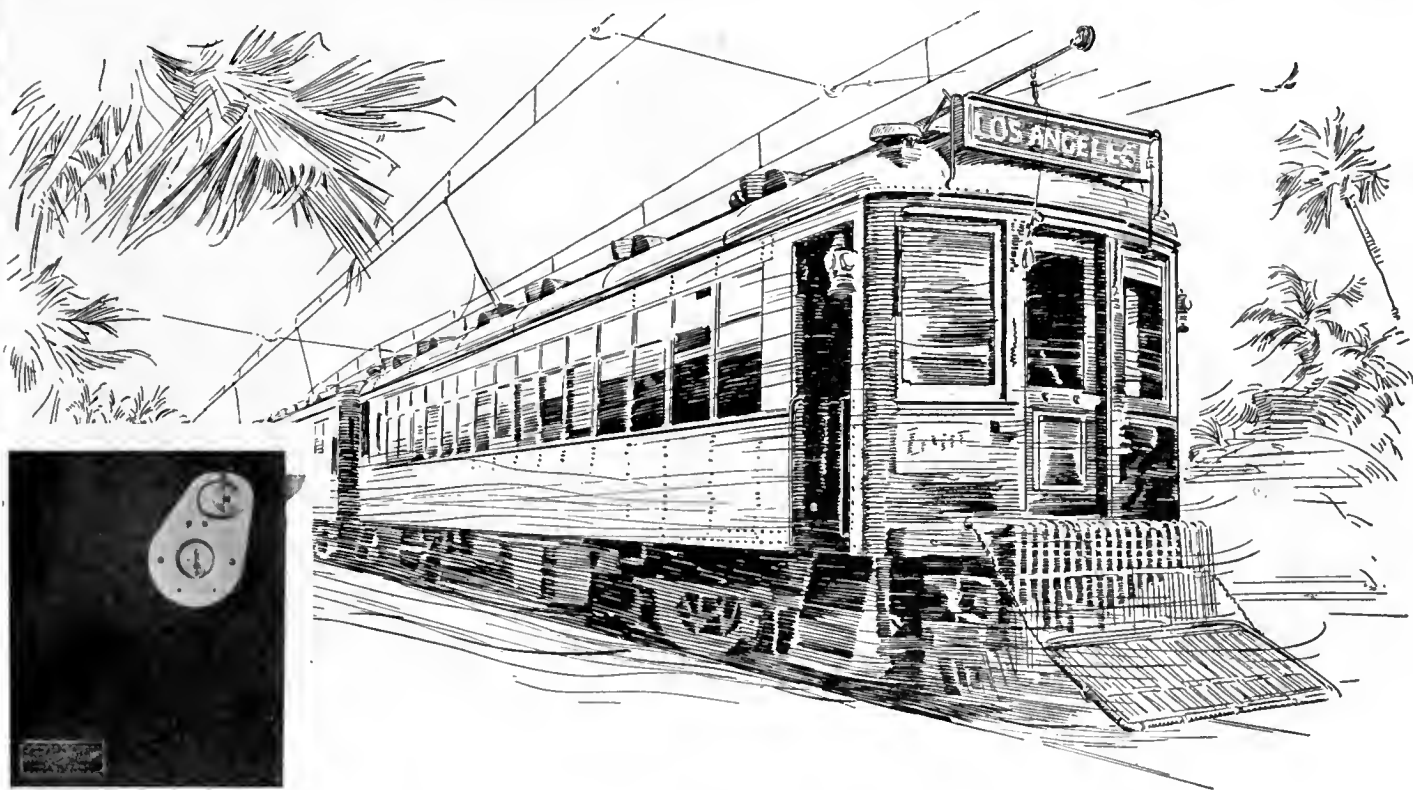
**T**HE only authentic and complete list of Electric Railway Companies in the United States, Canada and Mexico. It lists all operating and holding companies; gives the names of all officials and department heads; the cities and towns connected by interurban lines; population of cities served; number of cars and miles of track; and an account of the power plant equipment.

### ***Do You Know?***

That 35% of the men in official positions with electric railways change in a single year?

Therefore you cannot afford to use out-of-date copies of the Electric Railway List.

## Get It—while it's new



# Rico Coasting Recorders

**Saved at Least \$82,000.00  
for Pacific Coast Electric Railway in 1917**

*From an article by G. H. Grace, in the Pacific Electric Magazine  
(Employees Magazine of the Pacific Electric Railway), Feb. 10, 1918.*

"If we had used power at the 1913 rate of 155 K.W.H. per ton mile during 1917, our power bill would have cost us approximately \$77,000.00 more than it did.

"Had we secured only 1008 miles per brake shoe in 1917\* our bill for shoes alone would have amounted to over \$5000.00 more than it did. And

to this saving must be added the labor saving of 17.4% in replacing, although no figures are available as to actual labor costs involved.

"Here, then, are two manifest savings aggregating \$82,000.00, due to coasting, and which should allay any doubts as to the financial results to be obtained, to say nothing of other definite savings in repairs of motors and other electrical equipment of cars."

\*Obtained 1221 miles in 1917 instead of 1008 miles in 1915.

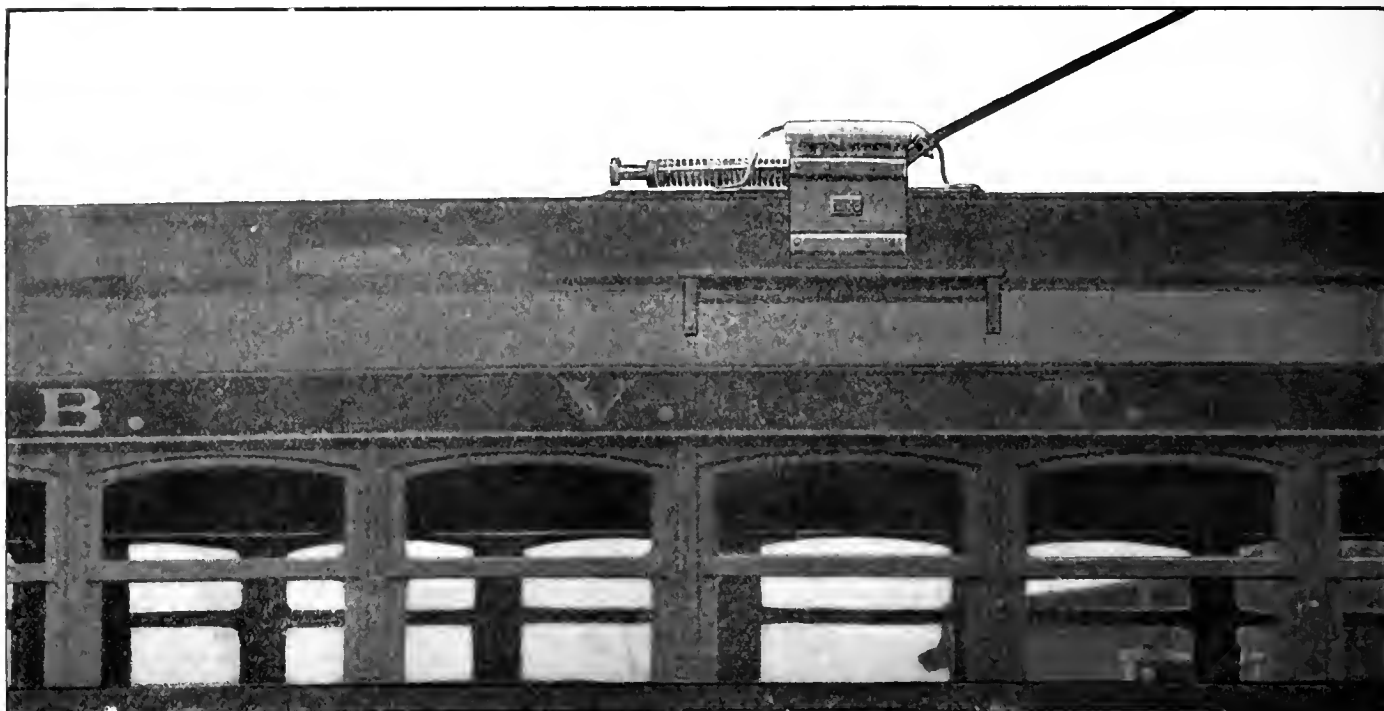


## Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO.



61 BROADWAY, NEW YORK.



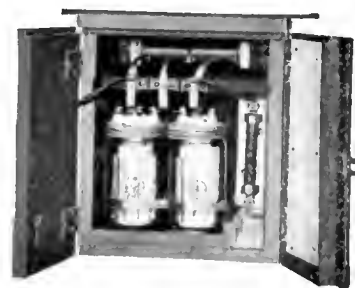
## No! You can't afford to take a chance with lightning this year.

A car knocked out by lightning means: Reduced public service, money and labor for repairs, lost revenue, dead capital.

Failure to protect against lightning wastes the resources and transportation facilities of the country at a time when they are most needed, and in addition reduces your own reserve for dividends.

The G-E Aluminum Arrester will prevent that loss. Its record on many systems for years has shown that it will protect efficiently and reliably against lightning.

We have arresters in stock, but transportation is slow. Order now and have the arresters in service before the early storms.



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\*Southwest General Electric Company. For CANADIAN BUSINESS refer to Canadian General Electric Company, Ltd., Toronto, Ont.  
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# Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 51

New York, Saturday, March 23, 1918

Number 12

## True Thrift in

### Fuel Conservation

THE dominant factors in electric railway management at the present time are the need for an increased fare, the adoption of operating economies, labor shortage and fuel conservation. Fuel conservation is too often considered purely from the viewpoint of the balance between the money-saving from any proposed method of reducing power consumption and the financial outlay necessary to accomplish the desired result. In the last analysis such a policy is short sighted because it leads to the depletion of our national resources for an immediate profit although these resources ultimately would have a greatly enhanced value. A policy which would conserve fuel and other natural riches can be designated as one of real, far-sighted thrift.

That we have been a nation of spendthrifts with regard to our natural resources has become a truism, and the time has now come when thrift, in its truest sense, is being forced upon us. We should recognize this fact and prepare for it even though it requires us to better matters from a different standpoint from that to which we have become accustomed by long experience and association.

The conservation of fuel is vital to our national welfare, not only in these war times but constantly. The reason for this is that even if the interest rate of the return on the investment for additional or improved apparatus is not sufficient in itself to make the venture attractive from a purely financial standpoint the necessity for true thrift still remains. That it is not possible to overturn well-established investment principles is of course obvious. On the other hand, it is well to recognize that thrift of the nation as a whole has become a factor of such importance as to affect individual choice.

## A Good Time to

### Disarm All Criticism

THE electric railways of the country are seeking popular support these days for many of their requests. This is as it should be, and there are evidences on all sides that the people from the President of the United States down are in sympathy with their contentions. Appreciation of these conditions must be shown while the public is in this mood, and if there are localities where the people are still hostile because of lack of information on company policy, steps should be taken to educate them.

The complaint department of a company is a good place to gage the public temper. True, the people who take the trouble to make a complaint or suggestion may be a small proportion of the patrons of the line. At

the same time they may be the very people to approach with conciliatory replies. It might also be a good idea to adopt the plan of a certain large Eastern company and send with each acknowledgment a copy of any literature which may be available setting forth the policy and aims of the management. When answers are made by mail the potentialities of a well-written letter should be kept in mind. The complainant should not be antagonized even if it is necessary to tell him that he is wrong. Experience of a Middle West property of considerable size has shown that 98 per cent of the complainants have been put in a more friendly attitude through correspondence and have frequently become outspoken advocates on the side of the management. The possibilities of making friends through this channel must not be overlooked. Patrons who sympathize with the attitude of the company are valuable at all times, and it is undoubtedly true that direct correspondence of the character indicated appeals to the public.

## Labor Conditions Largely Control

### Selection of Shop and Way Tools

THE munitions works, shipbuilding yards and other necessary war industries are requiring thousands of men trained in the mechanical and electrical trades. In addition to these demands of a civilian nature, the government is needing several hundred thousand more such men to take care of the intricate machinery which forms such an important part of the equipment of a modern army. As far as the labor problem is concerned, the old law of supply and demand is giving way to the equally aged one of military necessity. And labor conditions will become even more tense as the war continues. The present needs, great though they now seem, are but a mere bagatelle to those that will exist before the war is over.

There is only one source of supply of trained men, namely, the technical industries. Electric railways belong to this class, and they with others are beginning to feel the pinch in the labor situation. The shortage is particularly noticeable in the shop and way departments. The work of the railways will have to be done with fewer employees. Both necessity and good patriotism will require it to be so.

But in order that it may maintain its going status, a railway must lay a certain number of ties, place a certain number of bonds, set a certain number of poles, repair a certain number of car equipments, etc., each year. Under the circumstances tools must take the place of men. Obviously, skill and care should be used in the selection of these tools. Ordinarily we would say that, other things being equal, that tool is best which for a given annual output has the lowest annual

charges. The old economic law involved in this idea takes into proper account the cost of labor. Unfortunately, however, it does not take into account the non-existence of a labor supply. It may well be, therefore, that under existing conditions economy and even quality of output may become subordinate to the labor factor. At any rate, the matter of available labor, present and future, should receive much weight in decisions relative to the selection of new shop and way tools.

### Electrical Night at the New York Railroad Club

**A**MONG the significant technical gatherings held during the course of a year the annual electrical meeting of the New York Railroad Club occupies a unique place. The club is primarily a railroad organization quite distinct from electric railway associations, and its attitude toward electrification is therefore conservative although entirely friendly. Under the auspices of its electrical committee, always composed of men prominently identified with electrification matters, the club has been able to secure each year the authoritative presentation of the very latest information on heavy electric traction. The meeting furnishes an unusually good occasion for the electrical men who know what is what in this field to get their data and their ideas forcibly before their brethren of the steam persuasion.

At the 1918 "Electrical Night" meeting attention centered on four distinctive locomotive designs. These were the latest New York Central bi-polar, direct-current, low-voltage machine, the enlarged New Haven alternating-current type for use on the New York Connecting Railroad, and the two direct-current, high-voltage types of locomotives, of each of which a number are under construction for the St. Paul Railway. Among these types there are sufficient variety and enough elements of novelty to give a decided technical news value to papers describing them. Hence we print elsewhere a rather extended abstract of the proceedings of "Electrical Night." Much of the information given has not heretofore appeared in print.

On the mechanical side these four locomotives divide themselves into two groups; two having bi-polar motors with gearless drive, the others twin multipolar motors with quill and gear drive. Simplicity is the prime desideratum in the first group, flexibility of support and high center of gravity are conspicuous in the second. One group happens to be the product of one manufacturer, the other of a second. As far as the St. Paul road is concerned the engineers are obviously convinced that both will be satisfactory in their respective fields on this property. The New York Central is well satisfied with the gearless and the New Haven with the geared quill drive (although its first locomotives were gearless).

Electrically the four machines differ widely in principle and in detail and again divide into two groups of two locomotives each, although the grouping is not the same as along mechanical lines. The two machines in one of these groups have regenerative control because they are to operate on heavy grades where regenerative braking is conducive to economy and safety. The others are non-regenerative, because the profile of the track in each case does not make regeneration neces-

sary; one also, if another reason is desired, because not inherently adapted to it. In the St. Paul locomotives the large number of motors is utilized in providing a speed and accelerating control involving small rheostatic losses. On the other hand, in the New York Central locomotive and in the New Haven locomotive, when operating on direct current, there is not as great an opportunity for energy saving. Numerous other electrical distinctions will suggest themselves and should be borne in mind when these machines are compared.

The questions that naturally arise perennially as the progress of electrification is viewed on these "Electrical Nights" are: Why doesn't the electric locomotive show some tendency toward standardization? and which of these existing types is the best all-round one? By way of answer it is possible at this time only to say that each new problem put up to the electric locomotive designers seems to involve new requirements which many times dominate. Again the development stage of any art is marked by change, but when closely examined the electric locomotive will be seen to be following certain rather definite and logical lines of evolution. After all, the electric locomotive is only emulating its steam predecessor's example in passing through these mutations, for the number of steam locomotive types which have appeared is legion.

### Knowledge of Advantages of Spreading Peak Becoming General

**F**OR several years past various committees of the American Electric Railway Association have been trying to impress on member companies an appreciation of the acuteness of the rush-hour problems. The committee on standards for car loading and the bureau of fare research gave much time to the subject, and the committee on cost of rush-hour service continued the investigation and made a report on the subject at the 1916 convention. "The fact that rush-hour service is not necessarily profitable because a substantial proportion of the receipts are taken during that period is not generally known," the report said. Agitation for "daylight saving" and "spread of closing hours" was recommended. This week the daylight saving plan becomes law and the month of April should witness the effect of its operation in lowering and widening the peaks. Manufacturers, merchants and others, also, are showing some evidence of an appreciation of what they can do to help.

War conditions have served to influence the public on such matters so that now, through publicity given by the War Board and other agencies, the question of "lowering the peak" has become one of real importance. Various public service commissions also have learned to appreciate what the "peak" means. The Oregon commission in its order of Jan. 5 expressed this thought happily in the following statement: "Hitherto we have thought only of accommodating the service to the public, but it is possible also to vary the movements of the public to suit the service. Considerable progress has been made in the spreading of peak loads by changes in the hours of beginning and quitting work in large industrial establishments, but much remains to be done. Office employees and professional men may also vary their hours in some degree so as to avoid travel-



ing at times when the cars are crowded with those in other occupations." The passage of the "daylight saving" bill will also help to "spread the peak" as it will separate the lighting from the transportation loads on power houses. This burden will be still further lightened if the plan for staggering the opening and closing hours is more generally adopted. If all factories and stores merely move forward one hour their opening and closing hours the great mass of riders will continue to use the cars at the same time.

Employers can serve the comfort of their workers as well as make for improved service generally if they will fix their working schedules so as to fit more nearly into slack periods of transportation. Professional men, shoppers and others who have the choice of their hours of travel also would do well to bear this situation in mind. It behooves the wide-awake railway manager to give due publicity to these facts. He can serve the interests of his company as well as his patrons by doing so. Undoubtedly civic associations and employers generally will join in any such movement for increased efficiency of service.

### Boston Turbine Accident Not Necessarily Discouraging

THAT great steam turbine in the Boston Elevated power plant will have wrecked itself in vain unless some valuable lessons are learned to compensate for a direct loss of possibly \$200,000 with incidental losses difficult even to estimate. There is no doubt in our minds, however, that both designers and operators will gain from the accident such technical information as will enable them to reduce if not entirely to eliminate all future risk.

From the investigations of our contemporary *Power* it is evident that the Boston accident was not the result of faulty design or of the use of defective materials. It was due apparently in the first place to the deflection of one of the cast-iron diaphragms, a circumstance which could hardly have been foreseen. It will not in the least influence confidence in the durability or reliability of the steam turbine in general or of the single-cylinder, high-capacity turbine in particular. It will, however, be a guide to designers in the future as to the materials and dimensions of parts to use in the construction of these machines.

Engineers and power plant owners generally have approved of the steam turbine as a worthy successor to the reciprocating engine. They accept it with its comparative complication because it is economical of steam, of floor space, of materials. Essentially its wheels, diaphragms, buckets, etc., must be thin and light, and the peripheral speeds, particularly in the low-pressure stages, must be enormous. At the same time the temperature and pressure ranges in the cylinder must be wide, clearances between buckets must be small, etc. The wonder of it all is that designers have made the turbine the marvellously successful machine that it is.

Aside from what the accident will teach the specialist the plainest lesson to power plant men generally is that they must understand their turbines perfectly, they must be alert to cut the machines out of service promptly if signs or sounds point to internal trouble, and they must enforce such inspection procedure as will insure the detection of incipient irregularities.

### Local Rate-Making Is Contrary to Public Policy

COMMISSIONS as well as men differ in common sense. When the Public Service Commission for the First District of New York recently refused the application of the New York & North Shore Traction Company for higher fares, we criticized the commission for placing technical and legal subtleties ahead of justice. This board, it will be recalled, admitted the need of increased revenues, but asserted that the company was bound by its franchise to a 5-cent fare. The basic contention was that the New York State Constitution, in requiring municipal consent to electric railway operation, gave the city power to impose fare and other conditions for the consent.

It so happened that the New York commission in this case placed great dependence upon a "luminous" opinion interpreting the similar constitutional consent provision in Pennsylvania. The commission proceeded to argue that a city cannot be restricted in imposing conditions of consent. Of course, it said, a regulatory body can withhold approval of a new franchise, if "the city insists upon a term or condition which defeats the public convenience and necessity," but if these are served, "it cannot modify the terms of the city's consent." Hence, the New York board contended, if a commission could not modify a fare clause before approving a franchise, how could the law permit the ridiculous practice of the same body changing the fare after approving the franchise?

But is it so absurd to think that a commission can refuse to approve a franchise because of an improper fare clause? By no means. Since the New York First District Commission appreciates the luminosity of Pennsylvania thought, suppose we mention the latest decision of the Public Service Commission of that State on this point. The case is that of the Northwestern Electric Service Company, which applied for certificates of public convenience, evidencing the approval by the commission of franchises secured from several localities. Each contract contained a provision by which the company agreed that its rates for house lighting should not exceed the maxima mentioned.

Did the Pennsylvania commission think it proper to approve such provisions? Read its finding:

The Legislature has established this commission for the purpose of regulating the rates to be charged by public service companies and has delegated to the commission the exclusive power to determine what are the just and reasonable rates for service rendered by such companies at a particular time.

It is clear that it was the intention of the Legislature to place these matters exclusively within the power of the commission, and, therefore, action by local authorities which attempts to establish rates to be charged by public service companies is contrary to the public policy of the Commonwealth.

The difficulty incident to the establishment of rates in a municipal ordinance has been brought forcibly to the attention of the commission in numerous cases recently. The contracts in question fix rates for service to the public, and we are of the opinion that for this reason they are not for the best interests of the municipalities, the company or the public. The applications are, therefore, refused.

Here is a broad-minded opinion, based upon the principles of modern utility operation. There is much more common sense exhibited in this decision than in the New York one. The so-called constitutional restriction is the same in both States, but the Pennsylvania commission interprets it reasonably.

# The Latest Commercial Electric Locomotives

On Its Annual "Electrical Night" the New York Railroad Club Discussed the Newest Electric Locomotives Under Construction or in Operation on the St. Paul, New Haven and New York Central Lines

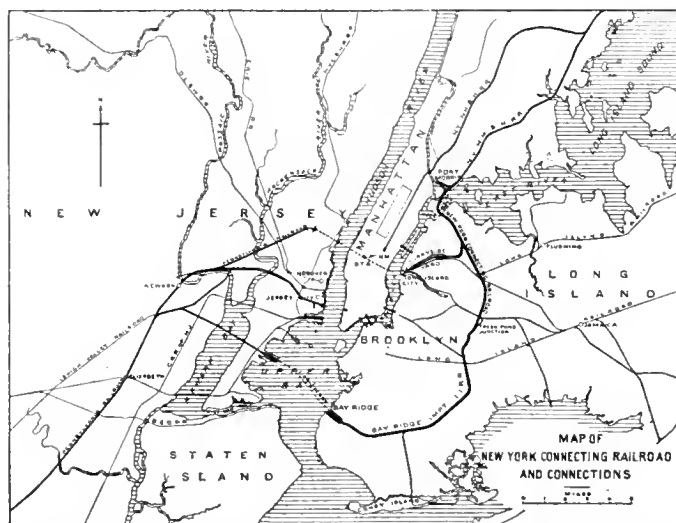
THE New York Railroad Club held its fourteenth "electrical night" on March 15, with a very large attendance. After opening the meeting C. E. Chambers, superintendent of motive power Central Railroad of New Jersey, president of the club, turned it over to E. B. Katté, chief engineer of electric traction, New York Central Railroad, chairman of the electrical committee.

Illustrated papers were presented by E. R. Hill, of Gibbs & Hill, consulting engineers, New York City; F. H. Shepard, director of heavy traction, Westinghouse Electric & Manufacturing Company, New York City; A. H. Armstrong, chairman electrification committee General Electric Company, Schenectady, N. Y., and Mr. Katté. An abstract of the papers is given below and on the following pages.

## New 180-Ton Locomotives for the New Haven Railroad

BY E. R. HILL

THE New York, New Haven & Hartford Railroad, as pioneer in heavy alternating-current railroad operation, opened the initial electric service to Stamford



ROUTE OF THE NEW YORK CONNECTING RAILROAD AND CONNECTIONS WITH PENNSYLVANIA AND NEW HAVEN SYSTEMS

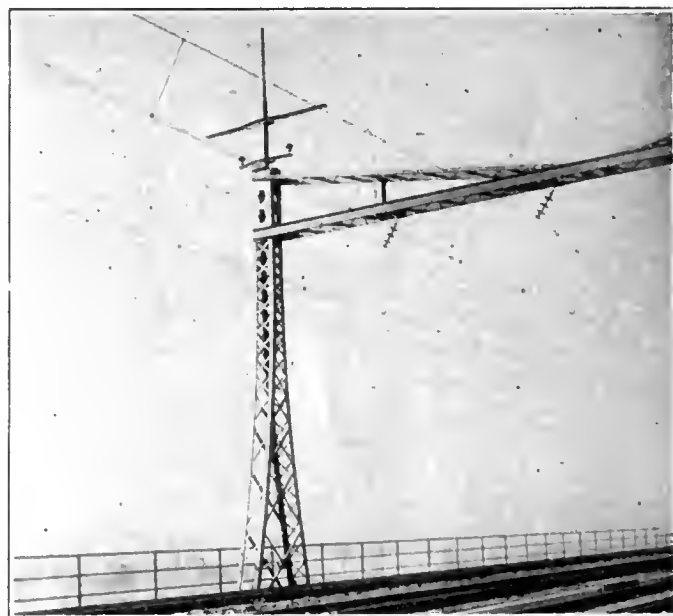
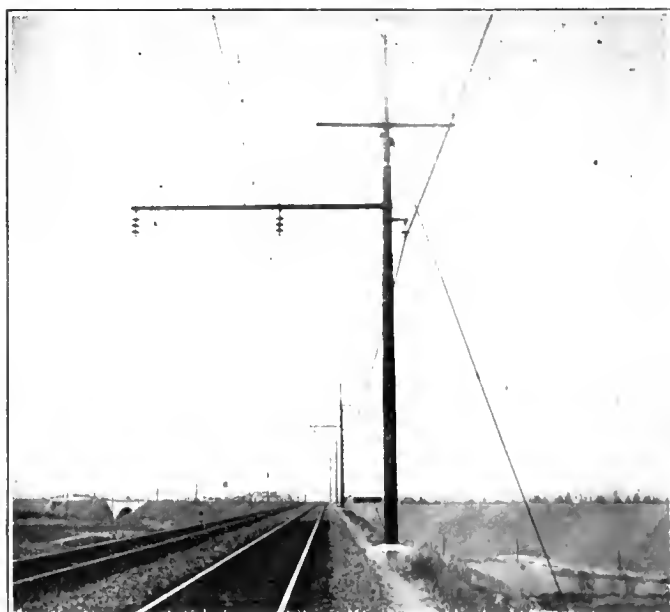
in 1907, the Harlem River branch in 1912 and the extension through to New Haven in 1914.

The extension to New Haven did not include sufficient locomotive equipment for 100 per cent electric operation of the division. For this purpose about twenty additional passenger engines, twelve freight engines and twenty-seven switchers are still required. The five new engines recently ordered and now under construction are part of the additional passenger re-

quirements. They are of the Baldwin-Westinghouse type, similar in many respects to the present locomotives, all of which were furnished by the Westinghouse Electric & Manufacturing Company.

There have been no recent additions to electrified track, but the completion of the New York Connecting Railroad over Hell Gate, the electrification of this line for passenger service via Sunnyside Yard into Pennsylvania Station, and the possibility of electrification later for freight service over this line and the Long Island Railroad to Bay Ridge have introduced some new problems.

The present New Haven electrified lines are nearly level, the maximum gradient being 0.4 per cent.



STANDARD BRACKET SUSPENSION ON NEW YORK CONNECTING RAILROAD—OVERHEAD CONSTRUCTION AT EXPANSION JOINT, LITTLE HELL GATE BRIDGE

Data on the New York Connecting Railroad are as follows.

Length of two-track passenger line—Port Morris to Sunnyside Yard .....	5 miles
Length of two-track freight line—Port Morris to Bay Ridge .....	20 miles
Maximum grade, westbound, approaching Hell Gate Bridge, 2 miles .....	1.2 per cent.
Maximum grade, eastbound passenger tracks, approaching Hell Gate Bridge, 1.7 miles .....	0.72 per cent.
Grade in Pennsylvania tunnels .....	1.5 per cent.
Length of four-track passenger and freight section—Port Morris to Sunnyside Junction .....	3.8 miles
Length of Hell Gate Bridge:	
Between abutments .....	977 ft.
Outside of towers .....	1,150 ft.
Clear height above mean high water .....	135 ft.
Cost of bridge .....	\$4,000,000
Cost of entire New York Connecting Railroad .....	\$30,000,000
Total cost of line, including Bay Ridge Improvements of Long Island Railroad .....	\$40,000,000

The 0.72 and 1.2 per cent grades on the single-phase New York Connecting section and the 1.5 per cent grade on the direct-current Pennsylvania tunnel section introduced new conditions affecting the operation of New Haven electric locomotives.

Express trains operated between Grand Central Station and New Haven average eleven steel cars and weigh about 770 tons. Maximum trains of this character are of twelve steel Pullman cars and weigh from 850 to 900 tons.

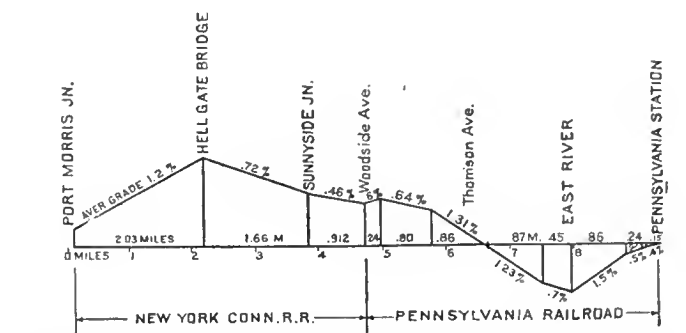
These same trains must be operated between New Haven and Pennsylvania Station over the heavier grades of the New York Connecting Railroad. To meet these operating requirements it is necessary to provide heavier locomotives than now in use on the line or double-head the present locomotives, as is frequently done on the heavier trains.

Another condition limiting the New Haven's operation is the restriction imposed by the New York Central as to total weight and axle loadings of locomotives using drawbridge and viaducts on their line into Grand Central Station. The New York Central's conditions limit loads on four driving axle locomotives to 47,500 lb. per axle, and on locomotives with six driving axles to 41,000 lb. per axle. There are limitations also as to the total weight of locomotive and to the extent to which double-heading is permitted.

The five 180-ton engines now on order represent the maximum in weight and capacity of the a. c.-d. c. type that will not exceed the New York Central structure limitations. This, however, does not quite meet the maximum desired performance for through express trains on the New York Connecting Railroad grades.

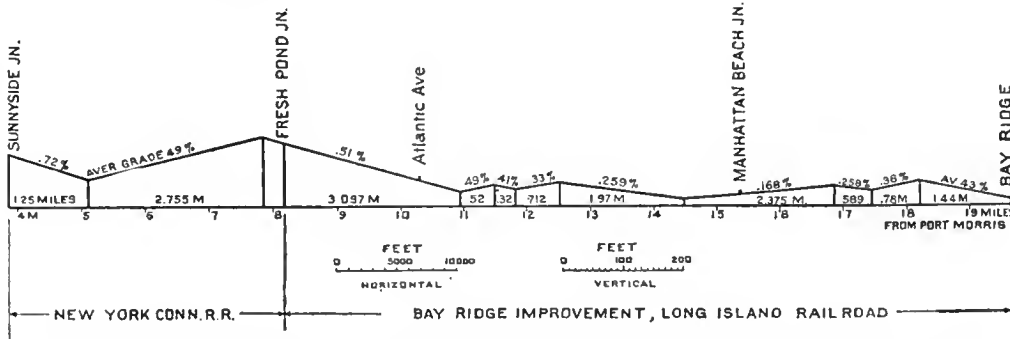
The new engine will handle twelve-car trains on the Pennsylvania direct-current terminal grades and east-

PRINCIPAL SERVICE DATA, NEW HAVEN ELECTRIC LOCOMOTIVES	
Maximum safe speed, m.p.h. ....	70
Balanced speed with 770-ton average train, in miles per hour:	
On level .....	60
On 0.4 per cent New Haven grade .....	42
On 0.72 per cent Connecting Railroad grade .....	35
On 1.2 per cent Connecting Railroad grade .....	26
Schedule speed of express trains, New York-New Haven, in miles per hour:	
Without stops .....	43.7
With four intermediate stops .....	37.6
Train Weights:	
Grand Central Station service east and west:	
Maximum local train .....	420 tons, 6 cars
Maximum local train double-headed with gearless engine .....	620 tons, 9 cars
Maximum express train .....	900 tons, 12-13 cars
Pennsylvania Station service:	
Maximum eastbound express train .....	850 tons, 12 cars
Maximum westbound express train .....	770 tons, 11 cars



PROFILE OF NEW YORK CONNECTING RAILROAD SHOWING HEAVY GRADES AT HELL GATE BRIDGE AND UNDER EAST RIVER

bound on the 0.72 per cent grade of the New York Connecting Railroad, but it will handle only eleven-car trains on the westbound 1.2 per cent New York Connecting Railroad grade. This latter grade is 2 miles long and it is proposed to employ electric pushers for assisting westbound trains of more than eleven cars up this grade. An alternative to this is to double-head

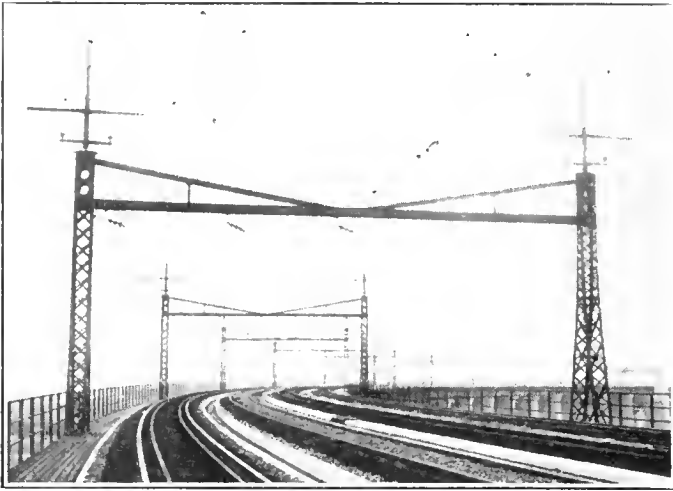


PROFILE OF PROPOSED FREIGHT EXTENSION OF NEW YORK CONNECTING RAILROAD TO BAY RIDGE

these engines with one of the old gearless-type locomotives.

Prior to the installation of the new locomotives the latest and largest type of locomotive on the New Haven road was the 2-4-4-2 engine of the 073-075 series, having four driving axles and two pony axles in two trucks, each driving axle being equipped with a pair of single reduction geared motors with quill drive.

PRINCIPAL DESIGN DATA, NEW HAVEN ELECTRIC LOCOMOTIVES			
	New 180-Ton	Present 120-Ton	Present 109-Ton
Series number .....	073-075	01-041	
Classification .....	2-6-2+2-6-2	2-4+4-2	2-4+4-2
Weights:			
Mechanical parts, lbs. ..	187,500	123,900	105,600
Electrical and air-brake parts, pounds .....	161,700	115,100	112,000
Steam-heating equipment and miscellaneous, pounds .....	12,800		
Total pounds .....	362,000	239,000	217,600
On each driving axle, pounds .....	41,000	45,500	41,900
On each pony axle, pounds .....	29,000	28,500	25,000
Rigid wheelbase .....	14 ft. 3 in.	8 ft. 0 in.	8 ft. 0 in.
Total wheelbase .....	59 ft. 6 in.	40 ft. 6 in.	30 ft. 9 in.
Length over all .....	69 ft. 0 in.	50 ft. 0 in.	37 ft. 7 1/2 in.
Diameter of driving wheels .....	63 in.	63 in.	62 in.
Diameter of driving axles .....	8 in.	8 in.	8 in.
Size of main journals .....	7 in. x 13 in.	7 in. x 13 in.	7 1/4 in. x 10 in.
Size of truck wheels .....	36 in.	36 in.	33 in.
Size of truck journals .....	6 in. x 12 in.	6 in. x 12 in.	5 1/2 in. x 10 in.
Type of drive .....	Quill-gearless	Quill-gearless	Quill-gearless
Number of motors .....	12	8	4
Horsepower:			
One-hour .....	2,550	1,700	1,120
Continuous .....	2,025	1,350	1,125
Maximum safe speed—m.p.h. ....	70	55	85
Tractive Effort:			
One-hour, pounds .....	21,000	17,700	9,700
Continuous, pounds .....	14,500	12,200	6,400
Momentary maximum pounds .....	47,500		
Gear ratio .....	27:87		



SPECIAL OVERHEAD CONSTRUCTION ON VIADUCT, NEW YORK CONNECTING RAILROAD

The new engines are duplicates of these present engines in all essential respects, the main differences being that there are three pairs of drivers on each truck instead of two, and pony axles are used at both ends of each truck instead of the outer ends only. In all principal respects also the details of the locomotive are identical with the thirty-four freight and heavy passenger straight single-phase locomotives built in 1911 for use in freight service.

The principal data regarding the three types of passenger locomotives of the road are given in the tables at the bottom of page 557.

The motors are connected in groups of three permanently in series, and the speed characteristics are substantially the same as those of the original gearless locomotives. The control is to be arranged for multiple-unit double-heading of locomotives of these two types. They are geared for a higher speed than the present geared-type locomotives and cannot be operated in multiple unit with them.

#### QUILL DRIVE INSURES FLEXIBILITY

The motors are grouped in pairs and connected by means of bearings and single-reduction gearing to a quill, which surrounds the axle, with ample radial and end clearance to prevent it coming in contact with the axle when in normal running condition. The motors, gearing and quill are supported from the truck

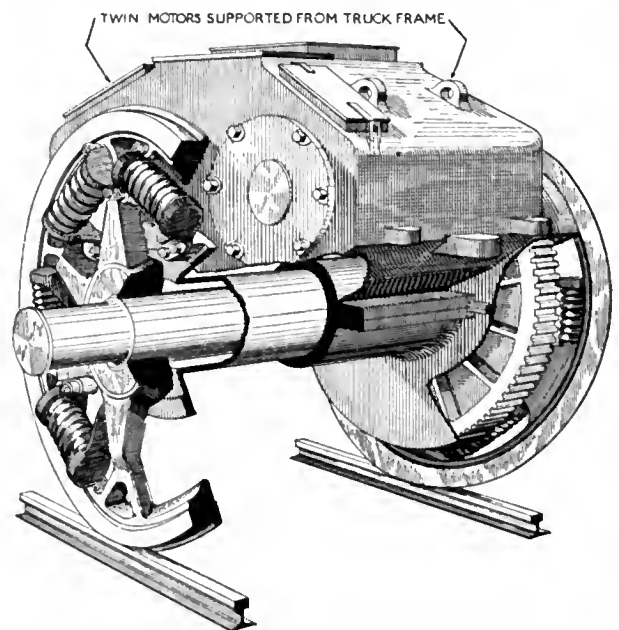
frame independent of the axle and wheels, the motors being directly above the center line of the axle. With this arrangement the weight of the motors, gearing and quill is carried on springs and the only dead weight coming directly on the track is that of the driving wheels and axle. The center of gravity is high, and good riding qualities and tracking conditions are secured.

The only connection between the motors and the driving wheels is through a group of six helical springs in each driving-wheel center, connected at one end to the spokes of the wheel and at the other end to the disk at the end of the quill. This arrangement is in use on all of the geared passenger, freight and switching locomotives of the New Haven road and has given excellent satisfaction. The motors are also identical with those used on certain of the passenger locomotives and on all of the geared freight locomotives, the total number of such motors being more than 400. By adopting this same type of motor suspension and drive, duplication and uniformity of parts is secured and saving in shop maintenance and operation is thereby effected.

The truck center pin is located between the first and second driving axles, thus making the truck unsymmetrical fore and aft of the center pin. This will tend to prevent oscillation or nosing of the trucks.

#### STEEL TRUCK FRAME CAST IN ONE PIECE

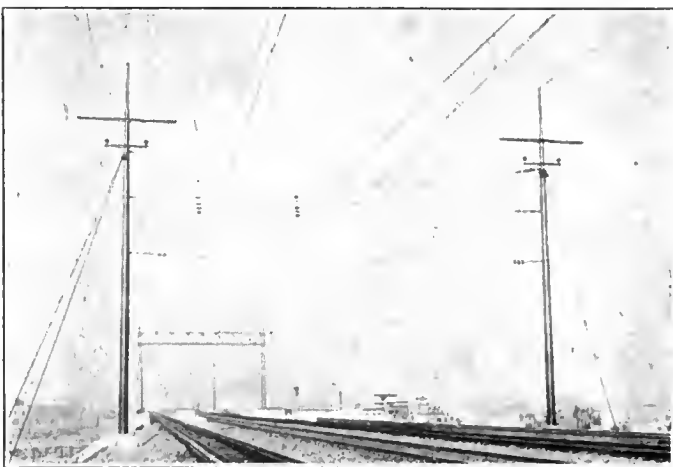
The drawbar pull between trucks is transmitted through a radial bar coupling and not through the cab. The weight of the cab is borne on each truck by six spring-mounted pads. The truck frames are of the integral cast-steel type, the entire frame and cross-ties



SKETCH TO SHOW THE CONSTRUCTION OF THE QUILL DRIVE

being cast in one piece. The saving in weight by the use of this type of truck frame is estimated to be 3200 lb. per locomotive. This feature is important not only because it is desirable to minimize the dead weight of the locomotives in general, but also because of the weight limitations of the bridge structures over which these engines are to operate and the guarantee which the manufacturers were required to give was that the total weight should not exceed 181 tons.

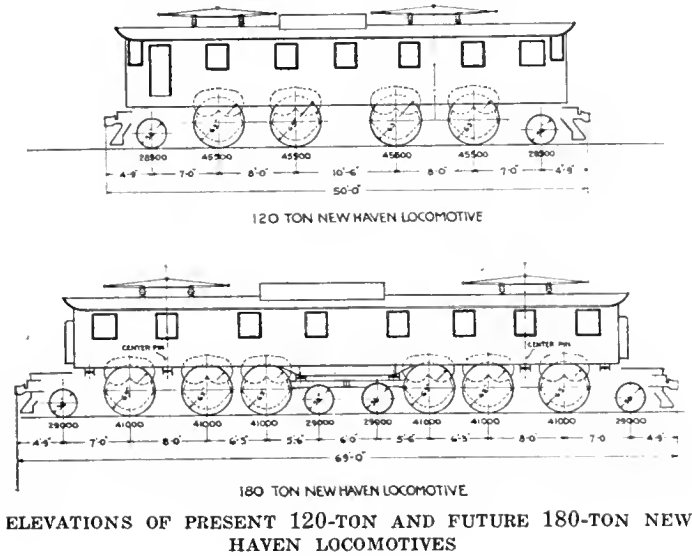
The motors and transformers are forced-ventilated



STANDARD SPAN CONSTRUCTION, NEW YORK CONNECTING RAILROAD

by means of two motor-driven blowers mounted in the cab. For train heating purposes the locomotives will be equipped with flash-type, kerosene-fired boilers capable of evaporating 4200 lb. of water per hour. Tanks having a capacity for 1440 gal. of water and 370 gal. of oil will be provided as part of the heating equipment of each locomotive.

These locomotives illustrate in a general way the



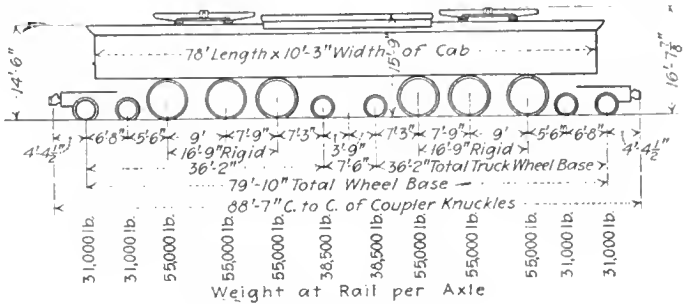
adaptability of electric traction in meeting the constantly increasing requirements of railroad service. In this case, without modifying the general type or any of the mechanical or electrical details and without exceeding existing weight limitations on bridge structures, a locomotive 50 per cent larger than the present one has been produced simply by the addition of a driving axle and a pair of motors to each truck with adaptation of mechanical and electrical details for the mounting and control of the additional parts.

266-Ton Locomotive for the St. Paul

BY F. H. SHEPARD

THERE are under construction for the Chicago, Milwaukee & St. Paul Railway ten Baldwin-Westinghouse locomotives similar to that shown in an accompanying illustration. These will weigh 266 tons each, of which weight 121 tons will be in the electrical equipment, 118 tons in the mechanical equipment and 27 tons in the heating equipment, including water. A diagram is reproduced to show the weight distribution and wheel spacing.

The locomotive comprises two running gears, with



WEIGHT DISTRIBUTION IN QUILL-DRIVE LOCOMOTIVES FOR THE ST. PAUL

the Pacific-type wheel arrangement. These are coupled back to back, supporting a single cab, which contains the auxiliaries and heating apparatus. The driving wheels are 68 in. in diameter, the driving wheelbase is 16 ft. 9 in., the wheelbase for each truck is 36 ft. 2 in., the total wheelbase is 79 ft. 10 in., and the total length between knuckles is 88 ft. 7 in.

HEATING EQUIPMENT OCCUPIES LARGE SPACE IN CAB

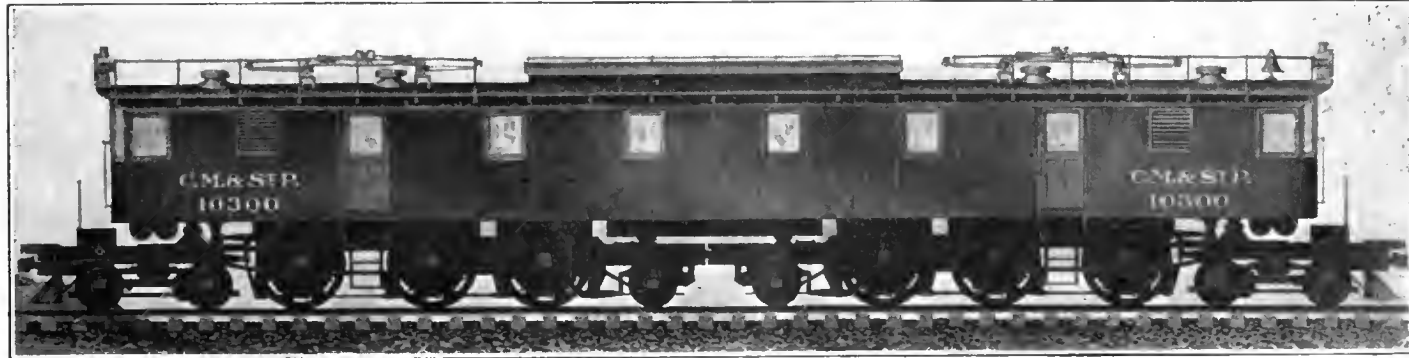
The layout of the apparatus in the cab is shown in the elevation and plan on page 560. In these it will be noted that a large part of the cab is occupied by the heating equipment. This includes boiler, water tanks and oil tanks. The rheostats are arranged above and near their controlling switches. The engine is, of course, made for double-end operation, each end having its complement of meters, air-brake valve, master controller, sanders, etc.

SCHEME FOR MINIMIZING RHEOSTATIC LOSSES

In one of the figures is a set of speed curves, showing operation on the nine running positions corresponding to one-third, two-thirds and full-speed positions, with two field-control positions on each. This provides economical operation over a wide range of speed. Regeneration from maximum speed down to 10 m.p.h. is provided for the purpose of holding trains on grades or making slowdowns. In another diagram the rheostatic losses during acceleration on a 2.2 per cent grade with a 950-ton train are indicated by shading.

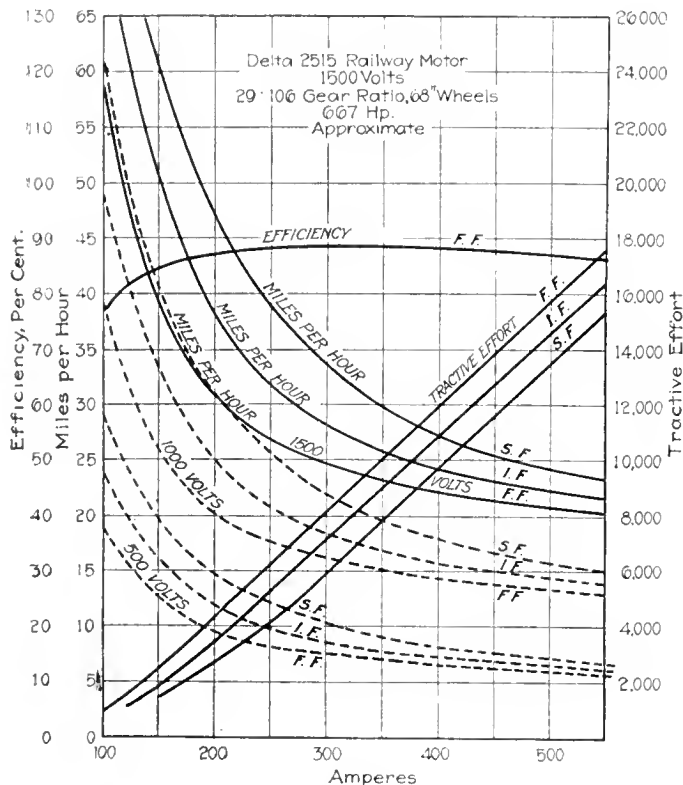
The continuous capacity of the locomotive is 3200 hp., corresponding to a tractive effort of 49,000 lb. at 24.5 m.p.h. The maximum starting effort is 110,000 lb.

The motive equipment consists of six twin motors with quill drive, these being mounted above each driving axle. Each armature carries a single pinion and the two, driving a single solid gear mounted upon the shaft, are held in position by quill bearings. Thus a movement of the axle within the quill shaft of



NEW LOCOMOTIVE FOR THE ST. PAUL RAILWAY, WITH TWIN MOTORS, QUILL DRIVE AND SIDE RODS



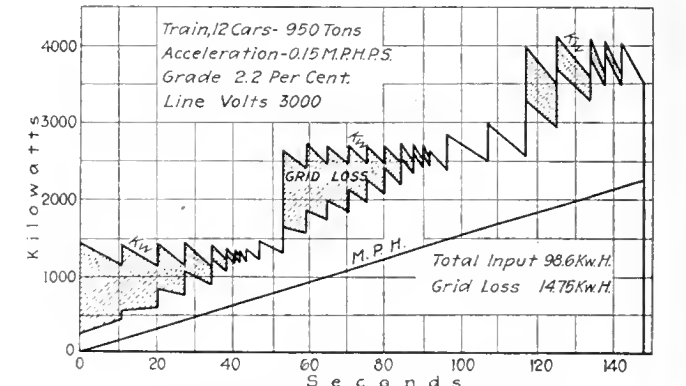
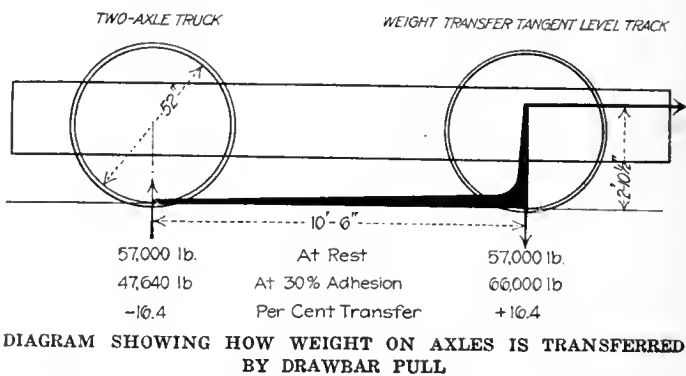


CHARACTERISTIC CURVES OF MOTORS FOR ST. PAUL QUILL-DRIVE LOCOMOTIVE

1¾ in. from normal position is secured, providing freedom of movement of the driving axles.  
This locomotive is, of course, provided with the well-known electro-pneumatic control.

### THREE SOURCES OF POWER SUPPLY FOR THE AUXILIARIES

Power for the auxiliaries is obtained from the 3000-volt contact line through a motor-generator set delivering current at approximately 80 volts. From this the train lighting is supplied, and to it a storage battery is connected. The blowers, air compressor, lights and control are all operated at 80 volts and their operation, due to the presence of the battery, is independent of line power. In addition to the motor-generator set and battery, there is a third source of low-voltage supply, which is utilized for the operation of the auxiliaries and for the excitation of the fields of the main

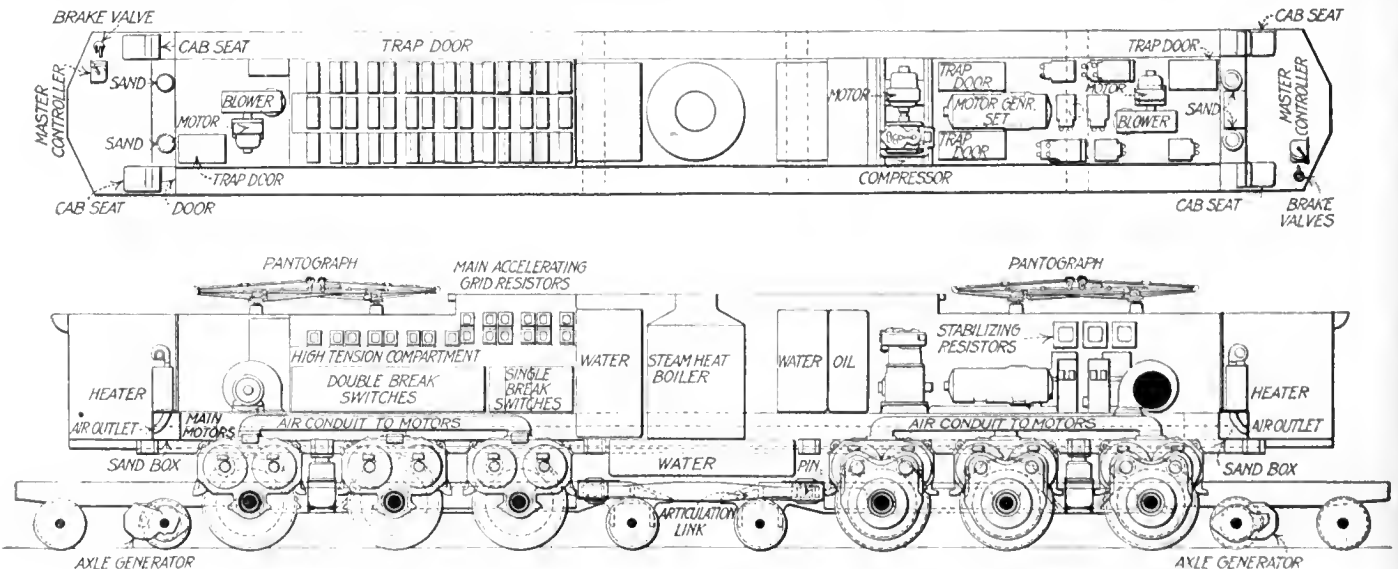


TYPICAL STARTING CURRENT GRAPH, ST. PAUL QUILL-DRIVE LOCOMOTIVE

motors for regeneration whenever the train has acquired requisite speed. This is a pair of axle-driven exciters, each being mounted on the inside axle of the four-wheel truck. These axle-driven generators are about the size of an ordinary street car motor, and furnish current, at low voltage, for the excitation of the main motor fields when regenerating, and at other times for the operation of the blowers and air compressors, independent of the battery. Thus the locomotive is at all times independent of line power for the supply of air for the brakes.

### CONSIDERATIONS FAVORING THE TWIN-MOTOR, QUILL DRIVE WITH SIDE RODS

A question naturally arises as to the considerations which led to the selection of this type of locomotive, possessing as it does certain mechanical complications as compared with certain other types. In the absence

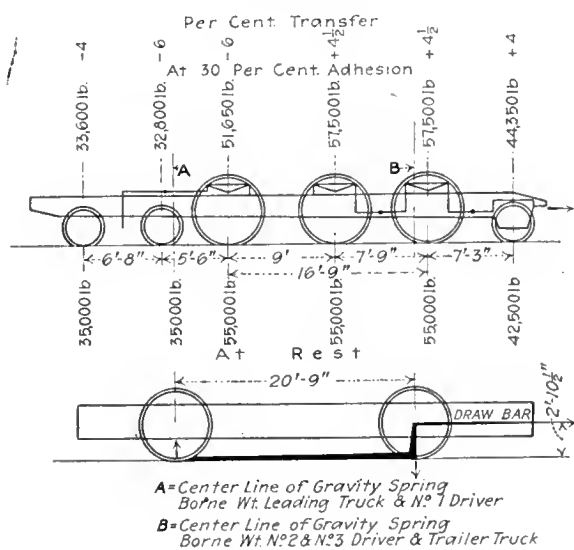


ELEVATION AND PLAN OF QUILL-DRIVE ST. PAUL LOCOMOTIVE SHOWING ARRANGEMENT OF EQUIPMENT

of service data which may be directly comparable the reasons may be classed as somewhat theoretical. In the first place it was understood that the weight on driving axles, both as to amount and disposition, in the present engines would not be accepted for additional engines for passenger service. A departure from the design of the locomotive at present in passenger service was therefore necessary. This could have been accomplished by the use of more driving wheels with smaller and lighter motors, or of very large motors with side rods. The service conditions require a minimum of six driving axles, with a weight of 55,000 lb. on each. This requirement can be very reasonably and economically met by twin motors with quill drive.

Among the advantages of this type of construction the following may be noted:

1. The limitation of voltage across any commutator



WEIGHT DISTRIBUTION AT REST AND AS MODIFIED BY DRAWBAR PULL, ON ST. PAUL QUILL-DRIVE LOCOMOTIVES

to 750 volts, thereby obtaining especially stable commutation for both motoring and regenerating.

2. The greater accessibility, lesser restriction in design, and greater freedom from injury to motors, due to their position above the axle remote from the roadbed.

3. The mounting of the motors rigidly upon the locomotive frames, thereby securing great flexibility between the roadbed and the motor mass.

4. The height of center of gravity of the running parts, which is  $43\frac{1}{2}$  in. above the rail.

5. The use of a minimum number of gears and the removal of the necessity for spring gears.

6. The very desirable wheel arrangement, weight distribution and equalization.

The utilization of the weight of the locomotives for adhesion is not of the same importance in passenger locomotives as in those designed for freight service. However, the relative value of wheel arrangement is affected by weight transfer, due to the tractive effort being applied at the height of the drawbar, as shown in the accompanying diagrams. Thus with 30 per cent adhesion the weight transfer of this wheel arrangement is no more than 6 per cent, while if the wheelbase were as short as 10 ft. 6 in. the weight transfer under the same condition would be 16.4 per cent. Thus for drag or heavy freight service the use of side rods has a dis-

tinct advantage, since all of the drive wheels on the truck are coupled.

The American railroad track is a cushioned, yielding structure, but unfortunately the yield of the rail due to wheel loads varies greatly, depending upon the track joints, special work, condition of ballast and sub-grade. This general condition is exaggerated, of course, by the extreme weather conditions experienced in this country.

A great deal of importance has been attached to such matters as center of gravity, wheel arrangement, size of wheels and equalization on steam locomotives, especially for passenger service. The steam locomotive, of necessity, consists of a large mass, including boiler and cylinders, carried on the locomotive frame, the driving wheels being loosely and flexibly connected thereto. Space limitations also require a relatively high center of gravity. It is a coincidence that this limitation in the design of steam locomotives automatically secures a reaction upon the roadbed which is inherently easy upon the latter. In view of the flexibility of the heavy parts of the locomotive, the individual axles are relatively free from restraint imposed by directly imposed weight. In the electric engine described these advantageous features are all retained. In the use of side rods on electric locomotives the action differs from that of steam locomotives in the entire absence of dynamic augment produced by the lack of counterbalance of reciprocating parts of the steam locomotive for all speeds. The electric locomotive with side rods is perfectly counterbalanced for all speeds, since the motion of the rods is of pure rotation only.

### 3000-Volt Gearless Locomotive for the St. Paul

BY A. H. ARMSTRONG

THE excellent operating results obtained during the past ten years with gearless motor locomotives on the New York Central tracks have attracted increasing attention to this form of construction. The extreme simplicity in design offered by mounting the armature directly upon the driving axle, thus eliminating all gears, quills, jack-shafts, side-rods, etc., has been reflected in great reliability and low cost of maintenance. It is, therefore, an achievement of much importance to announce the entry of the gearless locomotive in mountain grade haulage, as it can be reasonably expected that this type of construction holds promise of equally good operation in this heaviest class of railroad service.

The gearless locomotive now under construction in the General Electric shops for the Chicago, Milwaukee & St. Paul extension to Seattle is equipped with fourteen axles, twelve of which are drivers and two guiding axles. The armature is mounted directly upon the axle and, with the wheels, constitutes the only dead or non-springborne weight of the locomotive. This weight is approximately 9,500 lb. as compared with 17,000 lb. dead weight on the driving axles of the present geared locomotives now in operation on this road. The two fields are carried upon the truck springs with full freedom for vertical plan of the armature between them.

The construction of the motors throughout is practically identical with that employed upon the New York Central gearless locomotives, but the capacity of the locomotive is much increased and the wheel arrange-

ment somewhat different. The following table gives the general physical characteristics of the locomotives now under construction:

DIMENSIONS AND WEIGHTS—C., M. & ST. P. 3000-VOLT D.C. GEARLESS LOCOMOTIVE	
Length inside knuckles.....	76 ft. 0 in.
Length over cab.....	68 ft. 0 in.
Total wheel base.....	67 ft. 0 in.
Rigid wheel base.....	13 ft. 11 in.
Diameter driving wheels.....	44 in.
Diameter guiding wheels.....	36 in.
Approximate height center of gravity.....	57 in.
Weight of electrical equipment, pounds.....	235,000
Weight of mechanical equipment, pounds.....	295,000
Weight of complete locomotive, pounds.....	530,000
Weight on drivers, pounds.....	458,000
Weight on guiding axle, pounds.....	36,000
Weight on each driving axle, pounds.....	38,100
Dead or non-springborne weight per axle, pounds.....	9,500

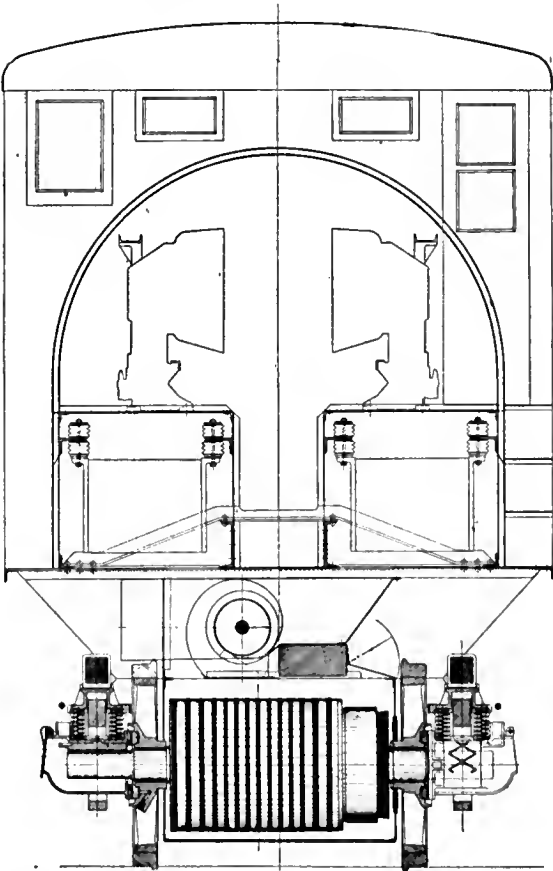
With twelve motors per locomotive available for different control combinations, there is a possibility of securing a wide range of speeds to meet the varying conditions of passenger train operation. Motors are connected three in series, giving 1000 volts per commutator for full-speed operation, but the control also permits a connection of four, six and twelve motors in series for fractional speed operation. Further provision for variable speed is made by shunting the motor fields in all combinations of motors, but it is probable that the greatest value of field shunt will be obtained with the full-speed connection of three motors in series. The following table illustrates the speed possibilities of this locomotive:

	SPEED CHARACTERISTICS—C., M. & ST. P. 3000-VOLT GEARLESS LOCOMOTIVES, 960 TONS TRAILING LOAD			
	On Level	Speed On 1/2 per Cent Grade	On 1 per Cent Grade	On 2 per Cent Grade
Three-motor shunt field.....	63.0	47.2	38.5	30.5
Three-motor full field.....	49.5	36.0	30.0	25.0
Four-motor full field.....	40.5	27.0	22.0	18.0
Six-motor full field.....	29.0	17.8	14.2	11.0
Twelve-motor full field.....	15.0	8.0	6.0	4.0

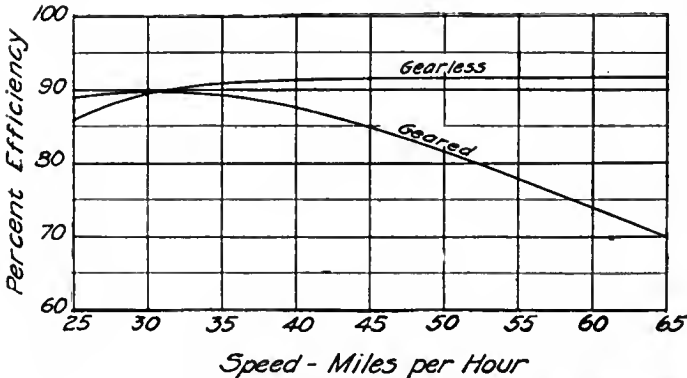
It is especially desirable that a passenger locomotive shall have sufficient weight on the drivers and reserve motor power to haul additional train weight on occasion, and in this respect the gearless locomotive under construction presents some attractive possibilities. The manufacturer's guarantees cover the operation of a twelve-car train weighing 960 tons against an adverse grade of two per cent at a speed of twenty-five m. p. h. Under these conditions there is a demand for 55,200 lb. tractive effort at the rim of the drivers and equivalent to twelve per cent coefficient of adhesion of the weight upon the drivers. There is, therefore, ample margin both in weight upon drivers and capacity of the motors to haul not only twelve cars but on occasion thirteen or fourteen cars, with practically no sacrifice in schedule speed and without overloading the motors or exceeding known and conservative practice as regards loading of driving wheels. For example, the gearless locomotive being built will permit the starting of a twelve-car train on a two per cent grade with a coefficient of adhesion of only twenty per cent and accelerate the train at 0.3 m. p. h. per second. The above general statements are tabulated below:

HAULING CAPACITY—C., M. & ST. P. 3000-VOLT D.C. GEARLESS LOCOMOTIVE	
Number of motors.....	12
One-hour rating, horse-power.....	3240
Continuous rating, horse-power.....	2760
Tractive effort, one-hour rating, pounds.....	46,000
Tractive effort, continuous rating, pounds.....	42,000
Tractive effort, 2 per cent ruling grade with 960-ton train, pounds.....	55,200
Coefficient of adhesion ruling grade, per cent.....	12
Starting tractive effort, 20 per cent coefficient of adhesion, pounds.....	91,600
Rate of acceleration, starting, 2 per cent ruling grade, miles per hour per second.....	0.3

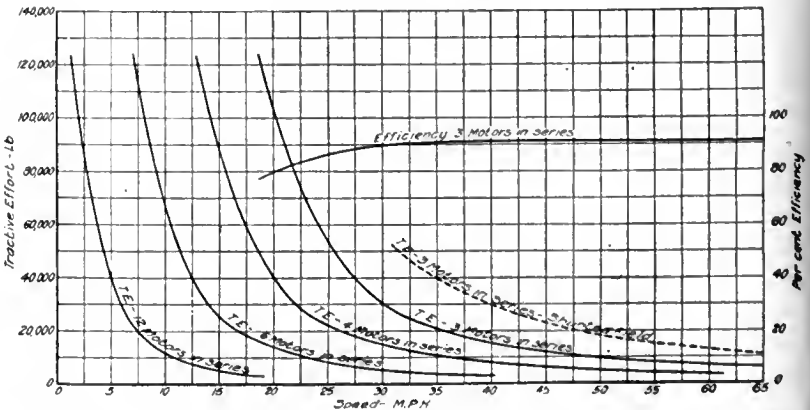
While the manufacturing guarantees are limited to 42,000 lb. tractive effort as a continuous output of this locomotive, preliminary tests upon a sample motor built



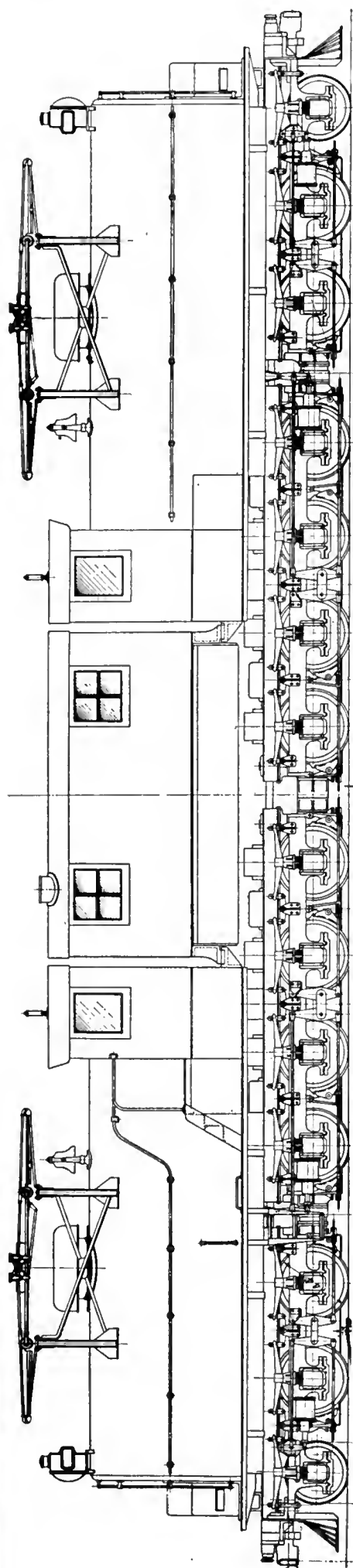
CROSS-SECTION OF NEW GEARLESS LOCOMOTIVE FOR THE ST. PAUL



EFFICIENCY CURVES OF PRESENT GEARED AND FUTURE GEARLESS ST. PAUL LOCOMOTIVES



CURVES OF TRACTIVE EFFORT AND EFFICIENCY PLOTTED AGAINST SPEED, ST. PAUL GEARLESS LOCOMOTIVES



ELEVATION OF GEARLESS LOCOMOTIVE FOR THE CHICAGO, MILWAUKEE &amp; ST. PAUL RAILWAY

indicate that this rating is conservative and that the final tests upon a complete locomotive when finished may show values materially higher than the guarantees made. This fact is of the greatest importance and holds out wide visions of radical changes in the operation of trans-continental trains, both passenger and freight.

The total weight upon drivers of 458,000 lb. is practically the same as the driver weight of the freight locomotive now in operation on the Chicago, Milwaukee & St. Paul. If, therefore, the completed locomotive meets the expectations of the builder, it offers the possibility of using the same locomotive interchangeably for both passenger and freight service.

The considerable speed variation permitted with four motor combinations insures a means of operating the locomotive at any speed demanded by the character of service to which it is assigned. Furthermore, when operating a freight train at lower speeds it can reasonably be expected that the tractive effort rating of the locomotive will be increased, due to the lower core loss at the lower armature speeds. While not primarily designed as an interchangeable locomotive, nevertheless it is quite possible that the flexibility of this new Chicago, Milwaukee & St. Paul gearless locomotive will become increasingly apparent when it is put into operation and its fitness for freight service will be fully recognized. It is needless to forecast the operating benefits that would result from having only one class of locomotive assigned to the road movement of either passenger or freight trains. Just as the Chicago, Milwaukee & St. Paul Railway was the pioneer road in long distance electrification, utilized for the first time 3000-volt direct current and employed regenerative electric braking on down grades, so also this road may introduce radical changes in the road movement of passenger and freight trains, by reason of the great flexibility offered in the gearless motor locomotive, which will be put into operation within the year.

#### MOTOR-GENERATORS WILL NOT BE USED FOR EXCITATION IN REGENERATION

The control of the gearless locomotive will in many respects be a duplicate of that now in successful operation on the geared motor locomotive previously installed. Provision will be made for regenerative electric braking on down grades as the success and operating value of this method of holding trains on down grades has been fully established during the past two years of electrical operation on the Chicago, Milwaukee & St. Paul Railway. The geared locomotives now operating utilize a motor-generator set for the purpose of motor field excitation while regenerating, and the results with this combination have been excellent. Careful experiments made during the past two years have demonstrated that motor-generator field excitation is not essential and, taking advantage of the advance of the art, the control for the new gearless locomotive will dispense with this feature. This simplification of the control and reduction in weight and cost constitutes a marked improvement.

It is estimated that approximately twenty-five per cent of the 550,000,000 tons of coal mined in the United States during 1917 was consumed under the boilers of steam engines hauling our railway tonnage. One of the greatest arguments for electrification is the saving of fuel effected and therefore it is very essential that the efficiency of electric locomotives be raised as high as possible, in order to fulfill one of the claims for their introduction. In this respect the gearless locomotive under construction offers a marked improvement as compared with the geared-motor locomotive.

#### GEARLESS DRIVE IS MOST EFFICIENT AT HIGH SPEED

The original installation of the Chicago, Milwaukee & St. Paul was undertaken with a single type of road locomotive for both passenger and freight service, the locomotives differing only in the ratio of the gearing between the motors and drivers. The locomotives were therefore interchangeable, except as to gears, with consequent

simplification of shop repair practice. The geared locomotive operates at a high efficiency in heavy freight service where pushers are used on up grades, but accumulative gear losses result in a low all-day efficiency of a geared locomotive in passenger service, when the profile is broken and contains long stretches of practically level track. On the other hand the gearless motor operates at highest efficiency on level track or lesser grades and it is this class of service that constitutes the bulk of the all-day duty of a passenger locomotive.

A comparison of the efficiencies of the present geared locomotive of the St. Paul road and the gearless locomotive under construction is presented in the curves shown on page 562 which are plotted with speed as abscissae, instead of the usual method of plotting efficiency to ampere input. A comparison of the two curves is most instructive. The average operating speed at about 50 m.p.h. shows a gain of 10 per cent in efficiency of the gearless locomotive as compared with the geared type and in fact throughout the entire range of speed from 30 m.p.h. up the gearless locomotive will operate at over 90 per cent efficiency, as compared with drooping characteristic of the geared-motor locomotive.

Electrical apparatus is inherently so efficient in its conversion of electrical into mechanical power that there is usually little gain in going from one type of motor to the other. It is therefore proper to note that the considerable gain in efficiency resulting from the adoption of the gearless motor is due almost entirely to the elimination of the mechanical losses inherent with geared motor drive. The exclusion of mechanical parts, such as gears, quills, jack-shafts, side rods, etc., utilized to transmit the power from the motors to the drivers with some forms of locomotive construction not only results in a marked improvement in the all-day efficiency of the locomotive, but is followed by an equally attractive increase in reliability and a marked reduction in maintenance expense. It is felt, therefore, that the introduction of the gearless locomotive upon the Chicago, Milwaukee & St. Paul marks a distinct advance in electric railroading and that this type of construction now for the first time made possible for mountain service will result in a marked improvement in the method of handling both passenger and freight trains in this most difficult class of railroad service.

### New York Central Well Satisfied with Its Bi-polar Motor Locomotives

BY E. B. KATTE

**D**URING the past year we have received on the New York Central Railroad nine new electric passenger locomotives of the type known as Class T-2B. The tenth locomotive will be delivered next month. These locomotives are very similar to the earlier Class T locomotives, in fact, when we asked the men in the operating department if they desired to suggest any changes, their representative held up his hands and exclaimed, "For goodness sake, don't make any changes, you will spoil them." As a matter of fact, thirty or forty minor modifications and improvements were made.

These locomotives are driven by eight motors of the bi-polar type, one on each axle. The total weight of the locomotive is 134 tons, and the drawbar pull at 25 per

cent adhesion is 66,000 lb. The load is about equally divided on all the wheels. The motors are known as GE-91-A and have a one-hour blown rating of 325 h. p., or a total of 2600 h. p. for the locomotive.

The capacity of the locomotive is the hauling of a 1200-ton train at 60 miles per hour. The maximum speed of the locomotive with lighter trains is 75 miles per hour.

As typical of regular service a Class T locomotive hauls Train No. 71, weighing 1035 tons, between the Grand Central Terminal and Harmon, a distance of 32 miles, making one stop, in 54 minutes running time.



CLASS T GEARLESS LOCOMOTIVE OF NEW YORK CENTRAL LINES

The average maximum speed is 57 m.p.h. and the current consumption has been shown to be equivalent to 21.9 watt-hours per ton-mile.

The cost of inspecting, maintaining and repairing our electric locomotive has averaged 3½ cents per mile during the past year. The locomotives are inspected after traversing an average of 3000 miles, which is equivalent to 33 days between inspections. As a measure of reliability I can say that Class T locomotives average 32,000 miles per locomotive detention.

### Some Details of the Boston Elevated Turbine Failure

**O**N FEB. 14 a 35,000-kw. steam turbine in the O Street power station of the Boston Elevated Railway was wrecked, the direct loss due to breakage being estimated at as much as \$200,000. This is a horizontal, 20-stage impulse turbine, representing the most advanced practice in single-cylinder machines of large capacity.

The details of the accident were reported briefly in the issue of the *ELECTRIC RAILWAY JOURNAL* for March 2, page 406. Since this was published the editors of *Power* have completed an investigation of the causes of the turbine failure. They conclude that a distorted cast-iron diaphragm in the eighteenth stage probably fouled the eighteenth wheel, breaking off the buckets. The buckets and diaphragms from this stage on to the last or twentieth, and the entire turbine casing, were destroyed.

The accident occurred just before 6 p. m., when the evening peak was coming on. Rubbing sounds from within the casing were heard and the machine was seen to vibrate. Within six minutes after the first indication of trouble the destruction was complete. Fortunately steam was promptly cut off by the tripping of the automatic throttle valve, presumably through the vibration of the turbine. Some comment upon the accident appears in the editorial pages of this issue.



# Track Engineers Meet

A Digest Is Presented of Reports of Electric Railway Interest Submitted  
at Meeting in Chicago This Week of American  
Railway Engineering Association

THE nineteenth annual convention of the American Railway Engineering Association was being held at the Congress Hotel, Chicago, as this paper went to press. The annual exhibit of the National Railway Appliances Association was being held at the same time in the Coliseum. Abstracts of the reports of especial interest to electric railway men follow.

## BALLAST

The report recommends three different sections of ballast for 24-in. depth under the tie. These sections apply to single track on tangent, double track on tangent and single track on curve. Each shows 12 in. of sub-ballast and 12 in. of top ballast. The committee feels that Class A track should have 24 in. of ballast under the tie, but is not ready to make general recommendations as to the proper depth of ballast of various kinds to insure uniform distribution of loads on the roadway.

Other recommendations for the Manual include seven new definitions, and matter relating to physical tests of ballast. Considerable data are presented on methods and cost of applying ballast, account being taken of organization, use and limitation of tools and ballasting by contract. Diagrams for the disposition of forces, as secured from a few roads, are shown, but the committee has thus far had meager responses to its inquiries along the line of organization. The committee interprets the consensus of opinion as being strongly against ballasting by contract in normal times, especially on an operated track.

The committee has brought up to date a general bibliography on ballast and ballasting made in 1906 in the library of the American Society of Civil Engineers. It also presents as a matter of interest the specifications for stone ballast of the Pennsylvania lines west of Pittsburgh.

## ECONOMICS OF RAILWAY LABOR

This report begins with an indexed tabulation of publications on the economics of labor. A second part is on "methods of securing labor." It says that there has been a decline in late years of the classes of men engaged through labor agents or padrones and that a large part of the better class of unskilled foreign labor that formerly went directly to the railways now goes to the mills and factories. There has also been a decline in all classes of common labor available for railway work. The railways have met this condition in an unorganized and desultory fashion, adhering to their existing methods of employment and endeavoring to obtain additional labor by various practices, such as maintaining a low hourly rate, but adding for extra hours not actually worked, so that the daily wage may be increased; also by a lessening of supervisory effort on the part of the foreman. These methods are

reprehensible but continue. The committee suggests that free transportation to labor might be curtailed so that men who desire transportation would not accept work to get it and then quit; also that more attention be paid to housing facilities. A third section of the report relates to feeding and housing maintenance of way employees and includes a digest of the laws in the various states covering this subject.

## ECONOMICS OF RAILWAY OPERATION

The report of this committee was accompanied by an extended bibliography, including such subjects as train resistance, car weights as affecting operating costs, economic length of train divisions, standards of maintenance of way, etc. The committee, which is a new one this year, was asked to report on the possible scope of a committee with such a title. It suggests a number of topics for future consideration, including economical speed of trains, additional main tracks and economic length of operating districts.

## TIES

The report of this committee was largely on methods in use for controlling tie renewals and its usual report on trials of substitute ties. As regards the former, reports were received from 100 railways with an aggregate mileage of 223,000, showing that a majority of the roads placed the principal responsibility on the section foreman, while a considerable number placed the responsibility primarily upon an inspector working independently of the section foreman. The information on trials of steel, concrete and other substitute ties includes all installations on steam roads in America reporting to the association.

## ELECTRICITY

This report recommends adoption in the Manual of a number of electrical definitions. Of these eleven are entirely new, others have been suggested by some association. The second part of the report brings up to date the company's statistics on third-rail and overhead clearances. The third section relates to "Electrolysis and Insulation." The subject considered is not electrolysis from railway return currents but the corrosion of concrete under the action of salt water. Under water power the committee calls attention to the increased cost of coal as being a factor in making hydroelectric developments attractive.

A section is also included on the proposed National Electrical Safety Code. In discussing the legal aspects of the code, the committee expresses doubt whether Part IV can be made valid law as a statute or as an administrative order. It is probable that the provisions of the code are in general reasonable, but valid objection to Part IV may be based upon the inflexible nature of the language and its interference

with the private management of business to an extent not justified in the interest of safety. Specific objection is made to a number of the requirements, generally because they are not strict enough. In general the conclusion is that the principles of the code are acceptable as tending to establish uniform electrical rules in the several states, but that the code is cumbersome, that certain of its requirements should be revised upward and its legality should be established by the opinion of an authority high in the federal government.

RAILS

The first section of this report recommends that the specifications for quenched carbon and quenched alloy steel joint bars, track bolts and nuts and for medium carbon steel track bolts and nuts, which have been held over for revision for the last two years, be adopted by the association in place of those now appearing in the Manual. The second section deals with rail failure statistics, a very comprehensive report on which appeared in the September, 1917, bulletin of the association. Failures are divided into head, web, base and fulcrum, and the number of failures compared on a basis of five year-service has been materially reduced.

The subject of special investigations is covered in the third section of the report and includes a series of papers on mill inspections, influence of gage length and elongation in drop tests, tests of manganese steel rails, inhibited or delayed transformation in rail heads, intensity of pressure on rails and rail failure statistics for 1916 covered in the previous section. The fourth section dealing with track bolts and nut locks recommends that the specifications submitted in 1916 be adopted, with some changes, by the association. Under mill practice dealt with in the fifth section the general results of mill inspection of rails manufactured in 1915 and 1916 are covered and there is a discussion of the specifications on which the rails were bought.

Progress is reported on sections six and seven dealing respectively with the study of joint bars from the standpoint of design and material and the relative value of various heat treatments. Subject eight on the intensity of pressure of rail resistance covers extensive field and laboratory tests dealing with the crushing effect on rail metal of various wheel loads. Methods of inspection covered in section nine state that it is believed that inspection of rails by the hydraulic bender could be carried on much quicker than by the drop test. On subject ten, commission rulings, the committee reports progress.

ROADWAY

The committee on roadway reports on the six subjects assigned to it, namely (1) recommendation for changes in the subject matter of the Manual; (2) methods of determining extent, character and effect of subsidence under embankments; (3) methods of estimating the shrinkage of embankments; (4) prevention and cure of water pockets in roadbeds; (5) a study of the unit pressures allowable on roadbeds of different materials; (6) the best method for draining roadway through stations and yards. The last is the only topic to which it has been possible to give full consideration. The substance of the report on this subject is that the drainage of roadway through stations and yards should be treated in accordance with local condi-

tions, but that the surface water should be carried off as quickly as possible. The proper method for doing this depends upon the soil, contour of ground, etc. Methods of procedure are given for different types of sub-grade and for the proper type construction in yards.

SIGNS, FENCES AND CROSSINGS

The work of this committee included a study of the subject of flangeways in crossings of steam and electric tracks. The report contains a number of tables of dimensions showing widths and depths of flangeway on straight and curved track for different weights of rail for both electric railway and steam railroad. The committee says that after careful consideration of these tables it recommends the following dimensions for flangeways on straight track:

	Steam Railways	Electric Railways
Depth of flange.....	M. C. B. standard..	7/8 in., 1 in., 1 1/8 in.
Width of flangeway..	1 1/4 in. ....	1 1/8 in., 1 5/8 in., 1 3/4 in.
Depth of flangeway..	1 1/8 in. ....	1 1/8 in., 1 1/4 in., 1 3/8 in.

For flangeways in curved tracks of steam railroads the report recommends an increase in width of 1/16 in. for every 2 deg. of curvature over 2 deg. For flangeways in curved tracks of electric railways no special increase is recommended, as the dimensions given above cover ordinary operating conditions. On some roads the width of flangeway is increased as the gage is increased, so as to keep the distance between the gage line and wearing surface of the opposite guard rail uniformly 4 ft. 6 3/4 in., which is good practice and recommended for excessive curvature.

For flangeways of steam railroad tracks located in paved streets, the reports show widths generally ranging from 1 1/2 in. to 2 1/2 in., with one case each of 3 in. and 4 in. These flangeways are, as previously reported, formed by rails laid on side rails placed upright with separators, planks and other paving materials, and special guard rails. For flangeways of electric railway tracks located in paved streets, the width generally ranged between 1 1/2 and 2 in., although one case reported a width of 3 in., another 3 1/2 in. The depth of flangeways of steam railroad tracks varies generally from 1 1/4 to 2 in., with two cases of 3 in., while the depth of flangeways of electric railway tracks varies generally from 7/8 in. to 1 3/4 in. .

The committee also continued its study in regard to fences and concrete fence posts and repeats its conclusion of 1914 that "concrete fence posts are practical, economical and a suitable substitute for wood."

TRACK

The report recommends various minor changes in the Manual and then passes on to detailed plans for turn-outs, cross-overs, slip switches, double cross-overs and other details of track construction. It is intended that the committee shall permit further plans on these construction details at the next convention. A report is made on the reduction of taper of tread of wheel to 1 in 38 and on canting the rail inward. The summary of this section is that the best results will be obtained from both wheel and rail wear if the rail is installed and maintained so as to provide a uniform bearing and wear on the head of the rail. A section on specifications for relayer rails for various uses classifies used rails suitable for relaying into those suitable for main track,

# Power Production in War Times\*

**How the Cost of Coal Has Gone Up and Its Quality Has Gone Down—Problems of Coal Delivery and Station Operation Which the Power Superintendent Has to Face—Possible Economies Suggested**

BY WALTER C. SLADE

Superintendent Power and Lines, Rhode Island Company, Providence

**T**HE problem of producing steam generated power in war times is one which is beset with difficulties and with trials. The question of the cost of production, although always of prime importance, has at times been obscured at least temporarily by the more important question whether for certain periods power could be produced at all, irrespective of the cost. In Rhode Island we have felt the shortage of bituminous coal keenly. The two power producing utilities at Providence have been operating of late with inadequate coal reserves, and the Rhode Island Company in particular has recently been forced to operate its main power station for three or four days with borrowed coal entirely.

The coal requirement for our railway power plants at Providence and Rockland for the year ending June 30, 1916, was about 73,100 gross tons. In the calendar year 1917 it amounted to as much as 90,500 gross tons, although the power generated had increased above the value applying to the former period by less than 5 per cent. The increased consumption, the cause of which is explained later, met with ever decreasing ability on the part of coal mining companies and transportation companies to fulfill requirements.

The Rhode Island Company, as is the case with possibly 50 per cent of the railway companies in the country, operates its own power stations exclusively for a

traction load. The diversity factor resulting from different classes of service which the average central station enjoys does not exist. The maximum demands for power, though relatively brief, are high as compared with the average load, and, characteristic of the railway load, the load factor is relatively poor. As the small engine plant at Rockland, which generated 1,423,217 kw.-hr., and the large turbine plant at Providence, which generated 73,492,300 kw.-hr. in 1917, represent widely different types and capacities of stations, they are further typical of many plants of the same kind now operating.

## COST PER TON OF COAL CONSTANTLY INCREASING

The prices which we have been forced to pay for coal in cargo lots alongside the Providence plant have varied, but they seem to be constantly increasing. For the fiscal year 1915-1916 we were fortunate in obtaining coal at a practically uniform price of \$3.32 alongside. We could then get discharging done at 8½ cents per ton. In the spring of 1917 we paid as high as \$11 and \$12 a ton for some coal and bought considerable coal at prices between \$6 and \$9 a gross ton. Later developments proved that this action was justified. Since the government fixed the price of coal and has established transportation rates and other rulings concerning the mining and shipping of coal, we have had to pay not less than \$7.72 a gross ton alongside for Southern coal, and one cargo has cost us as much as \$10.35 alongside. The average price is now running to more than \$8.35 alongside, provided there are no demurrage charges. Due to government regulation, the consumer absorbs not only demurrage charges, whether they occur on cars or on the boat at loading end or at discharging end, but also other charges, such as war taxes, insurance, etc. To date we have received nearly \$6,000 in demurrage bills on the last eleven boats, on which about two-thirds was incurred at the loading end. Finally, from 8½ cents per ton our discharging costs have advanced to 15 cents to 23 cents per ton. This is due to the fact that we are obliged to discharge boats on overtime work to avoid the high demurrage charges, and to-day coal passers along the water front are demanding 50 cents per hour straight time, 65 cents per hour overtime and 75 cents per hour for work on Sundays and holidays. They are able to get the money. The majority of these men are unable to read or write or to speak or understand English.

Early in the year 1917 we realized from the experience of the previous winter the necessity of providing at an early date a supply of coal to carry us through the winter of 1917-1918. We planned to accumulate a

*(Concluded from page 566)*

those which may be made suitable for main track by resawing and those suitable for side tracks. A fourth class includes those suitable for scrap purposes. A further section of the report is devoted to the design of cut track spikes. The design submitted by the committee is the same as that recommended by the committee in March, 1916, with the exception that there is a reduction in the amount of reinforcing under the head for the spike.

The effect of fast trains on the cost of maintenance of way and equipment is the subject of one section of the report and is illustrated by many plates and by one important and comprehensive chart which divides the factors influencing the cost of maintenance of way and structures into three elements, namely, weather stress, density of traffic and character of traffic, differentiating between passenger and freight traffic. It is stated that a fourth factor, *i. e.*, the ability of the management to regulate the expenditures in strict accordance with the demand of the traffic may enter into consideration. The last section of the report devoted to the subject of widening of flanger of wheels considers it to be unnecessary to make any difference in the width of flange-way of frogs and crossings or change the present method of track construction.

\*Abstract of address before the New England Street Railway Club, Boston, Feb. 28, 1918.

supply that would carry the station for perhaps three months, and between early May and July we increased our tonnage from approximately 6000 to 26,000 gross. In August we discovered that we were going to have trouble with fires in part of the stored coal before the winter was over, due to the rapid heating property of some of the coal which was of poor quality, though it had been purchased at high prices. We had our fire trouble even earlier than anticipated. Besides this, about Sept. 1 coal shipments became less frequent, so that we were forced to draw upon our storage supply, and in December it was reduced to about 7500 gross tons. In early February we consumed what coal we had left and were finally forced to operate on coal borrowed through the aid of the local Fuel Administrator. There was delay in loading coal and in transporting it by water. The longest delays have been in elapsed time between the completion of loading and the arrival of the boat at point of discharge. Formerly boats used to come through in a week or less, but the time required during last winter was from one week to five and a half weeks, with an average of possibly two and a half weeks. This delay was doubtless due to the deficiency in towing capacity in the coastwise trade. During all this period we had exerted all possible pressure to have suitable deliveries kept up to prevent the depletion of the supply.

#### QUALITY OF COAL KEPT GETTING WORSE

Prior to the time when the coal mining conditions became abnormal and transportation facilities became demoralized, we had made a practice of burning New River coal or Pocahontas, the average analysis of which used to run about 14,900 B.t.u. Even the same grade of coal, due evidently to poorer preparation at the mines, and at a later time due possibly to the pooling of the coal supplies by the government, gave noticeably lower average B.t.u. value on analysis. The spot cargoes which were purchased outside, consisting mainly of Pennsylvania coals, but which were expected to be of average quality, in some instances were of extremely poor quality. Of the coal placed in yard storage, 35 per cent showed a heat value under 14,500 B.t.u. and 46 per cent under 14,750 B.t.u. In fact, 21 per cent was under 14,000 B.t.u., some of it containing 15 per cent ash. Due to the deterioration of this coal in storage before it was consumed under the boilers, the average B.t.u. value of the coal as fired was not over 14,300 B.t.u. The effect of the quality of the coal was reflected directly in the cost of operation, in addition to the effect of the higher cost of the coal alongside. It resulted also in increased boiler-room maintenance. The net result was to raise the unit cost of power for the year 1917 by 104 per cent, as compared with the twelve months ended June 30, 1916.

The coal factors for both power stations have been growing worse since the fairly satisfactory showing for the year ended on June 30, 1916. This year was the last fiscal year that was not affected materially by advancing costs of fuel, material and labor.

The unusually high factor for the turbine plant in 1917 was due to a combination of operating conditions requiring a large number of banked hours on standby boilers not used in 1916, together with the necessity of burning a considerable amount of inferior coal, as well as coal damaged by spontaneous combustion. The performance will not be repeated in 1918. In fact, under favorable conditions the plant was operating for a part of January at 2.13 lb. The decrease in economy at both turbine and engine plants, as shown above, has been of the same relative order.

#### COST PER KILOWATT-HOUR MORE THAN DOUBLED AT MAIN PLANT

As regards the increased cost of busbar power, some comparisons may be made with the costs which apply to the year ended June 30, 1916. Comparing the last six months of 1916 and the year 1917 with this period, we find that the cost per kilowatt-hour at the busbar increased for the six months 23.4 per cent and for the following twelve months 104 per cent at the Manchester Street plant. At the small Rockland plant the busbar cost of power for the same periods increased respectively 31.8 per cent and 73.5 per cent. The cause of these remarkable increases in the unit cost of power, as stated above, is due primarily to the abnormally high price of coal, but also to the character of the coal that was burned. Some of the coal was of such poor quality that it raised our stoker and furnace maintenance to an undesirable point. The increase in the cost of fuel, as fired, was 132 per cent, and raised the fuel charge in 1917 to as much as 83 per cent of the total maintenance and operating costs. Referring to operating charges in the same year, while fuel cost advanced 132 per cent over the 1916 cost, wages advanced 30 per cent and all other operating charge 25 per cent. The average of the above percentage increases is 106 per cent. The kilowatt-hour delivered increased only 4.9 per cent and the pounds of coal per kilowatt-hour 18 per cent.

#### WHAT SHALL WE DO WITH OUR RAILWAY STATIONS?

Before concluding, I will dwell briefly upon a few possible economies, first in power production and second in power utilization. The great majority of the existing railway power plants were built at a time when 25 cycles was the only commercial frequency that was considered suitable for traction purposes. These 25-cycle plants as a rule enjoyed no diversity factor in their load. Only the power stations of the larger capacities can compete with the large central stations of to-day in the cost of manufactured power. So much capital is invested in these large railway plants that even though they are able to generate less economically than adjacent central stations, it is difficult to consider anything but a continuance of the operation with added improvements in the interest of economy of these stations. Between the average large 60-cycle central station and the average large 25-cycle railway station there can be no interchange of power except through frequency changers, a method which is sufficiently uneconomical to make this exchange feasible only for emergency purposes. Such an arrangement for emergency operation is, however, feasible. It is also equally practicable in certain cases, it would seem, when new equipment is added to existing 25-cycle power plants.

	Manchester Street Station		Rockland Station	
	Lbs. Coal per Kw.-Hr.	Per Cent Increase	Lbs. Coal per Kw.-Hr.	Per Cent Increase
12 months ended June 30, 1916.	2.28	...	3.49	...
6 months ended Dec. 31, 1916.	2.38	4.4	3.78	8.3
12 months ended Dec. 31, 1917.	2.69	18.0	3.99	14.3

to install the equipment for 60-cycle operation, so that in the future more railway plants would be able to take advantage of central station power which in normal times is steadily being produced at decreasing cost, as well also of hydroelectric 60-cycle developments that will, doubtless, be made throughout the country. In short, the big 25-cycle power plant must continue in operation as an individual unit, operating either independently or to varying degree in conjunction with other power stations to obtain both a desirable diversity factor and to reduce capital investment that would otherwise be necessary for new equipment.

But what of the small engine-driven railway plant that is struggling along trying to produce power cheaply even in normal times? Many of these plants could and should be shut down as soon as arrangements can be made for equipment suitable for operating from central station or hydroelectric service. With increasing cost of coal, the balance is all in favor of the big station, and it is questionable if the price of coal in future years reaches a minimum that is \$1 to \$1.50 a ton above the prices that prevailed before the war.

#### BOILER ROOM ECONOMIES ESPECIALLY NECESSARY WITH HIGHER FUEL COST

As regards increasing economies in our power stations I am going to speak principally of the boiler room. In ordinary times the fuel item will represent from 70 per cent to 75 per cent of the total cost of generated power. I recently stated that our own experience had seen the fuel cost reach a point equal to 83 per cent of the total cost, in fact, at least 90 per cent of the total cost was expended in the boiler room for fuel, water, wages, supplies and materials required for maintenance. We should indeed consider spending money in such a field where such a large proportion of the expense of production lies.

The best solution, perhaps, is to follow the practice, already observed I believe in a few cases, to put under the chief engineer a technically trained man or at least a man who understands the theory of combustion sufficiently well, who can keep constant check of operating conditions in the boiler room, working in constant touch with the chief engineer. This type of man has been termed "combustion engineer." Even plants of moderate capacity could well afford to maintain such a man on the payroll. Working with the assistance of the necessary weighing, measuring and metering devices with which he should be provided, he could put the true spirit of industrial control into boiler room practice. To aid the "combustion engineer," so called, in effecting the desired economies, it would be well to consider the advisability of making the operation of all equipment as nearly automatic as possible. Man power may be at a premium for some time to come, and at all times undue dependence on the human element is undesirable.

#### WILL INSTALL AUTOMATIC SUBSTATIONS

Transmission, conversion and distribution of power are but a step beyond its production. In this field there has been developed an idea which makes additional economies possible for all. I mean the automatic railway substation. We have built and are preparing within a short time to start two small automatic substations. We hope to build more at a later

date if these prove successful. With these stations we will eliminate power losses and labor, which more than offset the additional fixed charges required for the automatic equipment or any possible increased cost of maintenance that we can contemplate.

#### SAVINGS POSSIBLE ON THE CAR

As regards the utilization of power, let us consider how power is being wasted at the present time on the car through unskillful operation of equipment, unnecessary application of brakes, wasteful use of heaters and lights. Without doubt there is not a railway company operating which is not able to reduce its power consumption by at least 10 per cent through a proper and persistent instruction of its motormen regarding economical methods of operation and to install some type of automatic checking device on its cars to maintain a record of performance after once established. I believe that in some cases power bills can be reduced without trouble and in a short time as much as 15 or even 20 per cent. At present, with the possibility of effecting savings as great as they are at the trolley car, opposition on the part of employees would indicate not only a great lack of co-operative spirit but a lack of patriotic feeling.

The effect of reducing the stops per mile has recently been discussed at length in the technical journals. If through the co-operation on the part of the people that we serve unnecessary stops can be eliminated and car mileage reduced, the effect will be immediately noticeable. Thermostatic control of car heating is an important consideration, because of the beneficial effect that it has in reducing the peak demand, as much as the effect in conserving power. Safety cars are, of course, of great interest to many of us at present and are surely capable of being used on at least a part of every railway system.

Other opportunities for establishing economies could readily be suggested. Some of these have been put into effect in Rochester, as described in a recent issue of the *ELECTRIC RAILWAY JOURNAL*. Another interesting example of co-operation in a small way between a railway company and an industry is the arrangement between the Pittsburgh Railways and the Westinghouse Electric & Manufacturing Company, at East Pittsburgh, where the latter company supplies cars to the railway line through a rotary converter in its factory. In this way a good voltage is maintained on the lines, and the rapid handling of the traffic to and from the works is assured. The load handled by the converter is removed from the railway power station at a time when it is most undesirable, and is put onto the power station at the factory at a time when there is a much lessened demand because of partial shutdown.

#### I. C. C. Report for 1916

The report of the Interstate Commerce Commission for the year ending June 30, 1916, just published, shows that on that date the total mileage of interstate railroad companies was 394,944, being an increase of 3802 miles as compared with the corresponding period in the preceding year. Of this increase, 1641 miles were single track and 1959 miles were in yard track and sidings. At the same time, there were 65,314 locomotives of all kinds, 2,342,217 freight cars, 54,774 passenger cars, and 98,190 service cars.



# Zone System Best for Rhode Island

## Special Commission Finds Conditions Require Central Five-Cent Areas and Two-Cent Intermediate Zones — Recommends Abolition of Municipal Franchise Taxes and of City Regulation

**A** MODIFIED zone system, with certain tax, franchise and other reforms, constitutes the relief needed by the Rhode Island Company, Providence, R. I. Such is the tenor of the recent report by the special commission appointed by the Legislature early in 1917 to investigate the affairs of this railway. The commission consisted of the chairman of the State Board of Tax Commissioners, the chairman of the Public Utilities Commission and the bank commissioner.

Since the report was submitted to the General Assembly on March 7, as noted in the *ELECTRIC RAILWAY JOURNAL* of March 9, the legislators have created a peculiar situation. In April, 1917, they approved a bill authorizing the special commission to certify any necessary fare changes to the Public Utilities Commission and directing the latter body to order such changes to be made. Now, however, as stated in the issue of March 16, the General Assembly by special order has prohibited a change in the rate of fare and created a committee of legislators to report before March 26 upon the electric railway situation. The new zone system was to go into effect on or before April 1.

Although the matter of adopting a zone system for the Rhode Island Company has thus not been finally settled, the report of the special commission is of value because of the system outlined for handling the fares on the company's 354.07 miles of electric railway track, and also because of the recommendations to the Legislature on other matters. These facts justify the publication at this time of further material from the special commission's report, which is now available in full.

### FINDINGS AND RECOMMENDATIONS

The findings of the special commission may be summarized as follows:

1. That the Rhode Island Company is furnishing to the people of the State transportation facilities which compare favorably with those furnished in other cities of approximately the same size, and that reasonable provision is made for the demands of the traffic.
2. That the Rhode Island Company does not receive a fair and equitable return upon the property owned and controlled by it and devoted to the public service, and for several years the property has been operated at a heavy loss.
3. That the fair value of property owned and controlled by the Rhode Island Company and devoted to the public service upon which the company is entitled to a fair and equitable return is \$29,000,000.
4. That 6 per cent is a fair and equitable return upon the property owned and controlled by the Rhode Island Company and devoted to the public service.
5. That a modification of the present system of fares and transfers is necessary to provide in part for a fair and equitable return upon the fair value of the property owned and controlled by the Rhode Island Company and devoted to the public service.

Upon the basis of these findings the commission recommended:

1. That primary regulation of the utility be by the Public Utilities Commission.
2. That municipal franchise taxes be abolished.

3. That the Rhode Island Company be relieved from its paving obligations as they now exist and be required to maintain only that part of the highway actually worn out by it, and to repair all damage done.

4. That routing of cars be changed to conform to the plan recommended by the commission's engineers.

5. That changes in equipment recommended by the commission's engineers be made as soon as practicable.

6. That the company provide some definite and adequate system for collecting and compiling statistical information relative to traffic costs, passenger movements, service furnished, and a record of the reasons deemed sufficient to warrant changes in routing or service furnished.

### TAXATION IS EXCESSIVE

In discussing taxation, the commission states that in Rhode Island the company pays taxes to forty-two subordinate taxing jurisdictions as well as to the State itself, and in twelve of these subordinate jurisdictions it pays two kinds of taxes. These various taxes, paid to the State and its subordinate jurisdictions, amount to \$498,186, or 8.44 per cent of operating revenue, and if the taxes paid to the United States (\$34,468) and the State of Connecticut (\$1966) be added, the tax imposed amounts to 9.04 per cent. If the calculation includes the payments made by the Rhode Island Company for paving and is based on revenue received from passengers only, the percentage reaches 10.73 per cent.

Such a rate of taxation, the commission feels, cannot be justified. Even if it were a fact that the receipts enabled the payment to be made without interfering with a fair and equitable return on the capital properly invested, the commission considers it unjust to exact in taxes 0.5 cent out of each 5 cents paid by a passenger. The company is one of the heaviest-taxed properties of its kind in the United States.

Exclusive of the taxes on real estate and tangible property, the company pays franchise taxes of \$147,860 in twelve cities and towns, and it pays the State 3 per cent (\$166,915 in 1917) of its gross earnings. The commission believes that the municipal franchise taxes are not justified under present conditions. If the system were a strictly urban one, there would be considerable force to the argument that there should be no franchise tax by the State or that it should be a small amount. Under conditions as they exist, however, the State appears to be the natural and proper recipient of such franchise taxes as should be imposed.

### STATE SHOULD REGULATE

The Rhode Island Company operates in twenty-six cities and towns and in each is subject to regulation by municipal authority. Under the existing system the company may at the same time be compelled to observe regulations emanating from State or local authority by any of the three following methods:

1. Regulatory power directly exercised by a town or city.
2. Regulatory power directly exercised by the Public

Utilities Commission in the performance of its functions.

3. Regulatory power indirectly exercised by the Public Utilities Commission where the action of a town or city is made the subject of review by the commission.

It is the opinion of the investigating commission that a direct and unified control by State authority will be in the public interest and will result in better and more uniform regulations. The regulating authorities will have a broader and more comprehensive view of the situation than under present conditions and will, therefore, be better able to judge as to the advisability or necessity of changes desired by either the public or the company. The business and social life of the whole State is more or less directly concerned in and affected by the operation and management of this utility, and its regulation should be positive and direct by State, not municipal, authority.

#### FAIR VALUE IS \$29,000,000

The commission reports the following figures for purposes of comparison on the basis of reproduction new:

Commission's engineers .....	\$28,966,755
Ford, Bacon & Davis .....	33,275,184
1910 Validation Commission's report corrected and brought to June 30, 1917 .....	29,565,193
Approximate cash invested .....	28,802,590

The cost of reproduction new was found by the commission's engineers, Sloan, Huddle, Feustel & Freeman, to be \$28,966,755 and by the company's engineers, Ford, Bacon & Davis, \$33,275,184. The cost of reproduction new less depreciation was \$22,345,913 and \$26,067,466 respectively. The difference in the totals arrived at, on the basis of cost of reproduction new, by the two independent investigations, amounting to \$4,308,429, is accounted for by \$979,951 for payments covering current liabilities of leased companies, which were held to have been improperly included; a difference in overhead percentages, resulting in a discrepancy of \$1,513,270; differences in quantities and prices of paving and grading, amounting to \$940,558, and certain other minor differences in unit prices used. With the first two items excluded, the difference amounts to but \$1,815,208, or approximately 6 per cent of the total cost of reproduction new as found by the commission's engineers.

The special commission decides that the fair value of the property owned and controlled and devoted to the public service is \$29,000,000. The preliminary report of the commission's engineers, which forms a part of the present report, was abstracted in the *ELECTRIC RAILWAY JOURNAL* of Nov. 3, 1917, page 815.

The commission states that apparently it would not have been possible for any of the companies involved to have accumulated a depreciation fund. It was not customary, and public opinion sustained the owners of public utilities in the belief that all revenue in excess of that required to pay ordinary operating expenses belonged to the stockholders. The courts were in many instances opposed to the accumulation of funds to provide amounts considered necessary for future accrued depreciation.

It, therefore, does not seem just or equitable in the present instance to deduct an amount estimated to be equal to the accrued depreciation from the cost of re-

production new to arrive at the fair value of the property involved. It appears reasonable and just to the commission, however, to allow, in determining the fair and equitable return, an amount sufficient to enable the company to maintain its property in condition to render properly and efficiently the service required without impairing the net returns.

In regard to the rate of return, the commission says that present conditions are so abnormal that it does not appear wise or expedient to attempt an adjustment of rates according to them, or to determine what would be fair and equitable merely for the present. It seems more reasonable to adjust rates on a normal basis, and then, if necessary, make special provisions to take care of the very unusual conditions which now prevail, as occasion may require.

Under normal conditions a net return of 6 per cent on the fair value would be enough to maintain an issue of stock for a like amount at par, or somewhat over, and also to attract capital in sufficient amounts to meet all the legitimate requirements of the business. It is not expected that the carrying into effect of the recommendations of the commission and the modification of the system of fares and transfers will immediately result in the earning of 6 per cent net on the rate-base. It is assumed, however, that the company will have sufficient revenue for efficient operation, and that at present some net return will be earned. Upon restoration of normal conditions, the commission says, the company should, after compensating for bad judgment, be able to earn 6 per cent net on the rate-base and in addition a fair profit for conducting a large and complicated business.

After an allowance of adequate provision for renewals and replacements, the property as a whole in the year ended June 30, 1917, fell approximately \$200,000 short of earning 4 per cent. If the calendar year 1917 were used, not one of the properties would show earnings of 4 per cent. The properties fell short to the extent of \$776,092 for the fiscal year ended June 30, 1917, of earning 6 per cent. This financial showing, the commission states, indicates clearly the necessity of immediate relief, if the service is to be maintained, whether the system is operated as a unit by the Rhode Island Company or as a number of independent roads by several companies.

#### ZONE SYSTEM SEEMS BEST FOR RHODE ISLAND

In adopting a zone system of fares as one of the means of relief for the Rhode Island Company, the commission summarizes the fare problem as follows:

##### *a. Flat increase in existing fare:*

Advantages: Ease of collection of fare, both passenger and conductor readily understanding the principle involved. All passengers are treated alike. No change is made in the method of identifying passengers. Existing fare limits are not disturbed. No tendency exists to restrict the spread of population to outlying districts and to encourage congestion.

Disadvantages: Increased fare of all riders alike. Exaggerated discrimination against short-haul passengers. Tendency to decrease short riding with consequent loss of the most profitable business. Tendency to increase jitney competition. Advance over present rate could not be less than 20 per cent. Tendency to discourage extension and expansion by the utility. Required making of change for all passengers or a ticket system.

##### *b. Transfer charge:*

Some claim that the free transfer unduly extends the length of ride for the original fare, and also that even if the ride is comparatively short an extra stop and start are

required as well as twice the equipment used by a passenger in a continuous ride. On the other hand, if a charge is made for transfers, there is immediately a demand for through service which may be perfectly just, but which, if granted, would seriously interfere with economical or convenient routing. A free transfer tends to equalize the charge between different sections within the transfer limits, encourages the spreading out of the population and does not encourage congestion. There is no general rule which may be applied to all cases; each transfer question must be determined according to the peculiar circumstances relating to it.

*c. Modified zone system:*

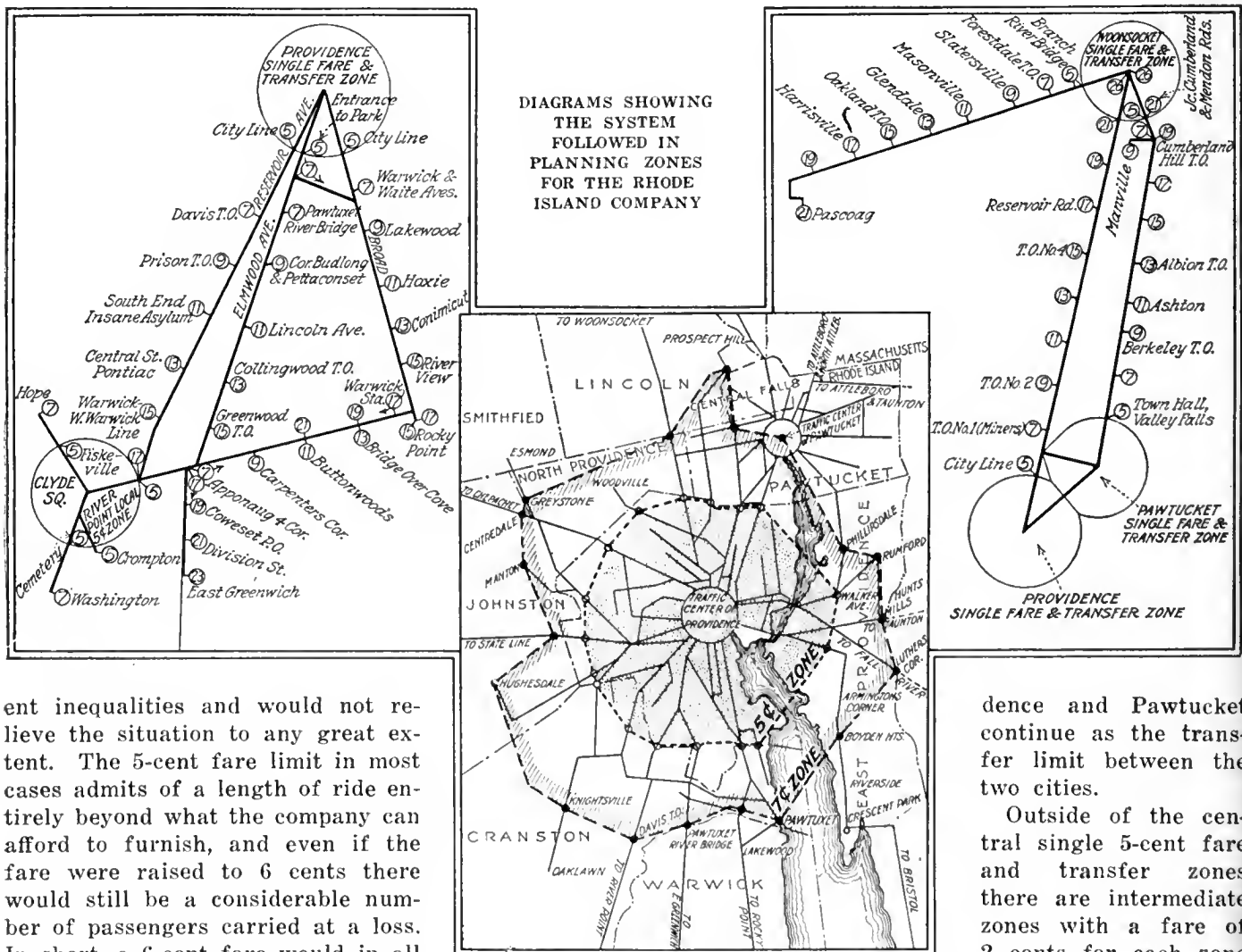
**Advantages:** The charge approximates service received. Reduced discrimination against short rides. Considerable flexibility. Reduced number of passengers carried at a loss. Only a part of the passengers affected. No tendency to reduce the number of short rides.

**Disadvantages:** Difficulty of identification of passengers and in the collection of fares. Tendency to prevent spreading of population beyond 5-cent fare limit and consequent congestion. Inconvenience to passengers required to pay several fares. An entirely new system of fares and fare collection with which both the public and the conductors are not familiar.

It is the opinion of the commission that a flat increase in the present fares would exaggerate the pres-

bad sociological effects will follow the application of the proposed system; inconvenience due to the change will be reduced to a minimum and the charge for transportation will be as nearly proportionate to the cost of the service rendered as is practicable. The increase in transfer privileges will be of substantial benefit to the public without unduly reducing the gross earnings of the company.

The accompanying diagrams and table indicate the system followed in planning the zone system. Single 5-cent fare and transfer zones as established are identical. Four transfer zones are provided for the following centers, viz.: Providence, Pawtucket, Woonsocket and Clyde Square at River Point. Limited local 5-cent fare and transfer zones are provided for Cranston and East Providence. A local 5-cent fare zone is provided from Olneyville Square, Providence. The Providence single 5-cent fare and transfer zone includes the area within a radius of approximately 2½ miles from Exchange Place as a center, excepting in the direction of Pawtucket, where the city limits of Provi-



ent inequalities and would not relieve the situation to any great extent. The 5-cent fare limit in most cases admits of a length of ride entirely beyond what the company can afford to furnish, and even if the fare were raised to 6 cents there would still be a considerable number of passengers carried at a loss. In short, a 6-cent fare would in all probability cause inconvenience and dissatisfaction altogether out of proportion to whatever advantage was gained, and there seems to be very little, if anything, to recommend a flat increase so far as the case under consideration is concerned.

It is the opinion of the commission that a modified zone system with 5-cent central areas will produce the best results and operate more justly to all concerned than either of the systems without modification. No

dence and Pawtucket continue as the transfer limit between the two cities.

Outside of the central single 5-cent fare and transfer zones there are intermediate zones with a fare of 2 cents for each zone and a minimum fare of

5 cents for travel through two zones. Upon the Danielson, Sea View, Pawtucket-Cumberland Hill and Chepachet lines, which present similar low earnings, the average length of such zones reflects a rate of approximately 2½ cents per mile. Upon these lines a minimum fare of 5 cents entitles a passenger to travel through three of such zones. Upon the other interurban or suburban lines

# Struggling with Poor Coal\*

**"Black Asbestos" Was the Name Given by One Engineer to the Material Which the Connecticut Company Tried to Burn Under Its Boilers Last Winter—  
To Difficulties in Combustion Was Added Injury to Mechanical  
Stokers Caused by Impurities, as Well as Other Troubles**

BY GEORGE E. WOOD  
Mechanical Engineer The Connecticut Company

THE Connecticut Company has six generating plants ranging in capacity from 16,500 kw. to 350 kw., which supply the entire system with energy, with the exception of the New Britain, Waterbury, Norwalk and Stamford divisions, the latter sections being supplied with purchased power. The total installed capacity is 40,000 kw., of which 12,000 kw. is held in reserve. The Bridgeport, Hartford and New Haven plants supply 85 per cent of the total output. Since the latter part of 1916 the quality of the

coal has been gradually getting poorer, and at present it is a continual struggle to keep the plants operating, to say nothing of trying to improve the efficiency. If good coal could have been obtained last year a 10 per cent increase in efficiency over 1915 would have been attained in fuel consumption, due to new and reconstructed plants. However, as the quality of fuel which could be procured was below standard, the actual tonnage consumed increased 24 per cent over that required in 1915 and 31 per cent over what would have been required in 1917 with standard quality coal. It appears that with good quality coal 7 per cent fewer cars would be required on the railroads compared with the rolling stock needed to handle what one of the company's engineers termed "black asbestos."

Soon after the first lot of poor coal was received the tonnage consumption began to rise. The company engaged the services of a competent combustion engineer, who instructed the various boiler-room engineers in the vagaries of combustion under the conditions attending the constantly changing grades of coal. Without his aid the tonnage consumed would have been considerably greater.

It is possible economically to consume low-grade fuels of uniform quality and corresponding low price, where the furnaces are designed to suit the fuel, with ash removal machinery capable of meeting the heavier demands, and, of course, suitable unloading facilities. When, however, a plant is designed for a high-grade coal and the fuel actually used is worse than a uniform low-grade product, there is no doubt as to what the results will be. Thus, one consignment of fuel received would pack down upon the tuyeres so solidly that the combined capacity of all the blowers in the plant could not force sufficient air through to allow it to burn. To attain any semblance of combustion, it was necessary to apply slice bars through the observation doors, and even then interruptions of varying duration could not be avoided.

About the time this coal had been "run through the furnaces" and the firemen were able to attain better results, the next shipment would be received. As this new coal followed the last of the previous shipment through the bunkers, the firemen would find that with the usual plenum in the wind boxes, the coal would be blown over onto the dump plates and pile up in a red-hot mass to a depth of 3 to 4 ft. Often the entire dump plate and shaft twisted out of shape so badly that they had to be entirely renewed. Within a few days some coal was received that would burn nicely for about an hour, after which it could be seen gradually to shut off the air supply. The shaking grates

(Concluded from page 572)

the average length of such zones varies from 1.18 to 2.08 miles and the average rate from 0.96 cent to 1.69 cents per mile. In the case of these lines, the commission determined a properly advanced through rate, having in mind the existing rate, the nature and density of traffic, and the probable effect of the increased rate.

LENGTHS OF ZONES AND RATES OF FARE UNDER SYSTEM PROPOSED FOR RHODE ISLAND COMPANY Interurban and Suburban Lines									
	Track Mileage			Intermediate Zones			Total Fare		
	Local	Inter-mediate	Local	Num-ber	Length	Cts. per Mile	New	Old	
Providence-Woonsocket.....	2.84	9.74	2.21	8	1.22	1.64	.26	.20	
Providence-Rocky Point.....	3.40	7.60	....	6	1.27	1.58	.17	.10	
Providence-Buttonwoods.....	3.40	9.97	....	8	1.25	1.61	.21	.15	
Providence-East Greenwich.....	3.45	10.66	....	9	1.18	1.69	.23	.20	
Providence-River Point.....	3.11	7.15	2.44	6	1.19	1.68	.22	.15	
Providence-Washington.....	3.11	8.31	4.82	7	1.19	1.68	.24	.20*	
Providence-Riverside.....	2.43	3.43	....	2	1.71	1.17	.09	.10	
Providence-Crescent Park.....	2.43	4.40	....	3	1.47	1.36	.11	.10	
Woonsocket-Pascoag.....	2.14	12.93	....	8	1.62	1.24	.21	.15	
River Point-Rocky Point.....	2.05	7.60	....	5	1.52	1.32	.15	.10	
Pawtucket-Crescent Park.....	1.64	7.83	....	4	1.96	.98	.13	.10	
Providence-Esmond.....	2.96	4.17	....	2	2.08	.96	.09	.10	
Providence-Oaklawn.....	3.23	4.08	....	2	2.04	.98	.09	.05	
Woonsocket-Manville.....	3.25	2.73	....	2	1.36	1.47	.09	.05	
Providence-Prospect Hill.....	2.76	3.96	....	2	1.98	1.00	.09	.10	

Interurban and Suburban Lines, With Low Earnings									
Pawtucket-Cumberland Hill.....	2.52	5.86	....	7	.84	2.39	.19	.10	
Providence-Chepachet.....	2.96	12.26	....	15	.82	2.5	.35	.30	
Providence-Danielson (State line).....	2.62	24.57	....	30	.80	2.5	.65	.55	
Sea View Railroad.....	....	19.14	....	24	.80	2.5	.48	.50	
Barrington, Warren and Bristol (Crescent Park to Bristol).....	....	10.57	....	10	1.00	2.	.20	.15	

\*Special book tickets, ten trips for 50 cents, have been issued to residents of East Providence, entitling passenger to ride between East Providence-Barrington town line and Post Office, Providence, without Providence transfer privilege, for 5 cents.

The existing 5-cent fare limits were adopted as the new 7-cent limits about Providence, thus making a uniform increase of fare of 2 cents to all persons living in the area included between the old and the new 5-cent fare limits, riding to and from Providence, but entitling such passengers therefore to a transfer within the Providence transfer limits.

\*Abstract of address before New England Street Railway Club, Boston, Feb. 28, 1918.

could not be moved more than  $\frac{1}{2}$  in., and a slice bar thrust in along the grates would lift nearly half the fire up from the grate. Steam jets in the ash pits were of little assistance in preventing this "India rubber" like clinker, and after a short time the plant was shut down for two hours. Section breakers and feeder switches were relocated to relieve the load on the plant, and the arrival of more coal made it possible to resume operation under these conditions. It also gave the operators a chance to take the boiler out of service and clean the heating surfaces, which were covered with soot and slag.

This boiler had been in service continuously for three weeks and as a result of the cleaning five barrows of stalactites were taken out, in spite of the fact that the boiler was dusted daily. If the boiler had not been taken out of line at the time, a deposit would have formed which practically would have closed the gas passage.

An investigation of the records of fuel analysis shows samples containing 24 per cent of volatile hydrocarbons, 45 per cent fixed carbon, 29.8 per cent ash and 3 per cent sulphur, with a calorific value of 10,300 B.t.u. per pound. One particular cargo "passed through the furnace" with the ash running close to 37 per cent by weight. The average for all coal received in 1917 was but little better than the case cited, for, although it may have had a greater heat content, the nature of the ash was such as to make it impossible to burn the coal with any degree of economy.

#### POOR COAL INCREASED MAINTENANCE

In addition to serious interruptions, which caused the public to criticise the company in spite of the fact that it was doing all that was humanly possible, great trouble has been experienced from stoker failures. These occur at some plants at the rate of two a day, and on this account it is impossible to repair them in a first-class manner. It is a case of patching up to keep going. This is not to be wondered at when one stops to think of the foreign substances found in the coal, such as trap rock, short bolts, coupler pins, slate, slag, brickbats and even pig iron. The smaller pieces pass through the crushers and into the furnaces, in spite of the vigilant eye of the weigh-hopper man, and then there is a cracked bearing cap, broken bracket or sprung crankshaft. Stoker repairs are tripled, and the stock of repair parts so seriously depleted that it has been necessary to make up temporary repair parts in the company's shops, to send a representative to the factory to look up delayed orders, and bring the parts to New Haven or Hartford by motor truck.

The poor quality of coal has added to the difficulties of the labor situation. It has been particularly difficult to retain the ashmen and firemen. For every carload of ashes taken out of the ash hoppers during 1915, three carloads are taken out at present. This means that the ash hoppers must at times be emptied upon the floor to make room to dump the stokers. It is often necessary to call in a local contractor to assist in this work in order to keep men on the job. On account of this condition a good laborer will not consider the proposition, and the result is that only mediocre men can be obtained.

An inspection of the operating records shows that the total unit cost of production for 1917 was 1.48

cents, or double the cost for 1915. Of this, 82.5 per cent is due to fuel cost. Comparing the total amounts for the fiscal years 1915, 1916 and 1917, the total cost of production for 1915 was \$630,000; for 1916, \$745,000 (an increase of 18 per cent for 8 per cent increase in production), and in 1917, \$1,187,500, an increase in production of 11 per cent and a cost increase of 90 per cent. In 1915 the total amount paid for fuel for the six plants was \$425,000, or 67 per cent of the total production cost. In 1916 it was \$520,000 or 70 per cent, and in 1917 it was \$976,900, or 83 per cent, which is more than twice that paid under normal conditions. Labor shows an increase of \$33,000 and maintenance an increase of \$70,000. It is not unreasonable to state that fully 90 per cent in the company's increased cost of power is due solely to the fact that the road is paying for, but not getting, coal.

#### COMPANY PLANS ADDITIONAL EQUIPMENT

Several plans are afoot to relieve conditions in the near future. The most important is the installation of additional ash-handling facilities and coal-handling equipment and storage space. In the last case it is proposed to discharge sufficient coal at each plant between the dates of April 1 and Nov. 1, 1918, to take care of the needs during this period and have stored at the latter date sufficient coal to carry the plants through until the spring of 1919. To do this it will be necessary to receive in 214 days 150,000 gross tons of coal, which is equivalent to unloading 692 tons per day. To attain this result the Connecticut Company will have to expend between \$200,000 and \$300,000. For the New Haven power plant it will have to furnish additional storage space. In the Hartford plant the same thing pertains, and in the Bridgeport plant another dock will have to be built, with facilities for reclaiming the coal and getting it into the bunkers. To put in this coal and get it into storage about \$500,000 will have to be expended. A quotation received in this connection for an eight-wheel locomotive crane with 50-ft. boom and a  $1\frac{1}{2}$ -cu.yd. bucket was \$18,458, compared with \$7,650 in 1915. This plan will relieve much anxiety as to coal shortage next year and will relieve traffic congestion.

The Connecticut Company has exerted every effort to reduce fuel consumption to a minimum. Strict attention has been paid to turning off all unnecessary lights and electric heaters; the skip-stop system of operation has been inaugurated; a vigorous campaign in power saving has been instituted with good results, and in all heating systems drips are trapped to avoid waste, all unnecessary coils are shut off, etc. In closing, the author quoted the ten suggestions for fuel economy published on page 1121 of the ELECTRIC RAILWAY JOURNAL for Dec. 22, 1917.

#### London Trams on Raid Nights

It was stated at a meeting of the London County Council that the running of tramcars on raid nights was subject to the general officer commanding the London district. When guns were heard the cars stopped, and restarted when firing ceased. So far as extraordinary circumstances were concerned, arrangements were made to enable passengers to complete their journeys without additional payment by rejoining cars with tickets issued before the stopping.



# Boston's Future Considered

## Service-at-Cost Plan and Public Control as Available Methods of Relief for Boston Elevated Railway Discussed at Legislative Hearing by Chairman Macleod of Commission and President Brush of Company

THE respective merits of the public control and service-at-cost plans for relief of the Boston Elevated Railway were discussed at recent hearings before the joint legislative committee on street railways and metropolitan affairs by Hon. F. J. Macleod, chairman of the Massachusetts Public Service Commission, and Matthew C. Brush, president of the company. Hon. Joseph B. Eastman of the commission also spoke at length upon the board's plan, and explained its details. A summary of the remarks of the two first mentioned follow:

### MR. MACLEOD DESCRIBES PUBLIC CONTROL PLAN

Mr. Macleod explained to the committee the difficulties of the company in rendering service under the severe winter conditions, and also because of labor shortage, high prices and long deliveries, combined with the need of additional net revenue. Passenger revenues in November, December and January fell off materially as compared with a year ago. Mr. Macleod then described the commission's plan of relief, involving public control of the property by a board of public trustees and a guaranteed dividend to the stockholders. Under the proposed plan the trustees would direct the general policies of the road, leaving the direct management in the hands of the operating officials as at present. The commission feels that the public would be more disposed to accept rate increases if established through public trustees with the excess above 5 cents applied to service betterment than by private directors. Mr. Macleod said that he could see no reason why under proper public control the car riders and the public at large would not meet a justified fare increase in the same spirit that the postage increase from 2 to 3 cents was met a few months ago. The chairman outlined the advantages of being able to raise money through public credit, as in Cleveland.

Some part of the cost of rehabilitation, the speaker thought, should be placed upon the community at large, in view of the peculiar position of the company with reference to existing rapid transit lines. At present it would cost the company about \$7,000,000 a year to meet its rentals, taxes and fixed charges and to pay a 6 per cent dividend. This would mean that out of every nickel only about 3.25 cents would be available for operation. "The rapid transit lines are breaking the back of the system," said the speaker, "and they will break the back of any system that tries to carry them, out of the receipts from the car riders. It never has been done and never can be done. In this case the problem will never be properly solved till the taxpayers assume their proper share of the burden. We hear a great deal about the car rider paying his way, and paying for what he gets. I agree to that, but you should go a step farther and say that the taxpayer should also pay for what he gets. Men who do not ride in the cars at all get more benefit in many cases from the operation of these rapid

transit lines than the car riders themselves. These lines in effect represent a duplication of existing street facilities." Mr. Macleod held that the possible contribution from the taxpayers should not exceed one-half the present cost of subway rentals.

Under public control, the speaker said, men of the type of the present management might properly continue in charge of the road. The commission has confidence in the ability of the present management, and considering the tools and facilities it has to work with, it has done about as well as could be expected under the conditions. In the last analysis a return on the investment of the stockholder is as necessary to keep the property running as the payment of wages to the conductors and motormen.

The commission itself, the chairman said, is too busy to take over the general direction of the company's policies. Its plan provides that if the trustees are unsatisfactory a new set can be appointed. Mr. Macleod said he approved of the general principle of the service-at-cost plan, and that there should be a direct relationship between what the passenger gets and what he pays for. This is provided under the commission's plan so far as the fare in excess of 5 cents is concerned, and the same principle might properly be applied to the basic 5-cent fare, at least to the extent of fixing a limit beyond which increases in the current costs of operation would be paid for by the car riders. Gov. McCall's plan, the chairman said, of authorizing the commission to grant temporary rate increases during the war would not be likely to give the company the credit necessary to obtain new money. Mr. Macleod said that he did not think the subway development in Boston had been in excess of public needs, but that subways are luxuries and that any community which desires them must be prepared to pay for them. The Boston Elevated company yielded to popular pressure in taking over such heavy subway burdens, but the action has proved very ill-advised from the standpoint of the company's interests.

The speaker commended the general principles of service at cost, but said that he did not believe that it would result in a spirit of co-operation between the public and the Boston company to anything like the extent of the plan proposed by the commission. The chairman thought the falling off in traffic would be less relatively in Boston in the event of a fare increase than on other roads, on account of the large amount of long-haul business handled.

### MR. BRUSH EXPLAINS ELEVATED POSITION

Mr. Brush reviewed at length the recommendations of the Beeler report to the Public Service Commission for possible economies on the Boston property. He agreed with Mr. Beeler that it is impossible to build subways for street cars and make them pay. Train operation eventually must come in the Boylston Street subway.

The company has petitioned for a third track in Commonwealth Avenue to increase the capacity of the Boylston Street tube and is considering four-car train operation with multiple-unit equipment. Express service would be rendered over this third track inward mornings and outward afternoons. Mr. Brush said that he would never dead-end a rapid transit line if loop construction were possible.

Mr. Brush disagreed with some of Mr. Beeler's suggestions, such as that to abandon the Park Street subway station in Boston and establish a single downtown terminal at Washington and Summer Streets. Others required considerable capital expenditure. He considered Mr. Beeler's report as thorough and intelligent and that it demonstrates that the necessary increase in net revenue can be obtained only through an increase in the present rate of fare.

The consolidation of divisions and carhouses, as recommended in the report, is economically desirable and has already begun. A substantial saving can be made by a keener, more co-operative spirit on the part of motormen in car operation. The company is doing everything possible by mechanical devices and others to encourage and compel a lower power consumption and a reduction in track and equipment maintenance by increased coasting. To equip all surface cars with coasting clocks would require about \$150,000. The savings secured by these on the rapid transit lines are good, though not as large as were estimated. There is a further saving possible on the surface lines by this means, but success depends on the sincere co-operation of the motormen.

Mr. Brush created a mild sensation by displaying to the committee a small truck-load of exhibits composed of investigations and reports made on the Boston Elevated property during the past few years. He reviewed the finances and investigation history of the road along lines previously printed in this journal. Some new figures as to the rental per subway mile which the company is required to pay annually were then presented. Mr. Brush then described the subway policies in New York and Philadelphia relative to the sharing of cost by the city. He maintained that subway rentals should not be borne by the car riders.

Mr. Brush vigorously resented intimations that the management had been lacking in initiative and cited numerous examples of advanced practice in the road's development. Among these is the installation of a 35,000-kw. turbo-generator set two years after units of 15,000-kw. rating had been installed to gain 20 per cent in efficiency, the use of motor-driven fare boxes (his company was the first in the world to provide these), establishment of prepayment areas, provision of signals on all rapid transit and the latest subway lines, remodeling of the power system from "straight d.c." to an a.c. and d.c. combined system, improvement in rolling stock designs, such as the building of articulated cars, provision of center-entrance motor and trailer cars, etc.

The investment carried by the company is now \$116,000,000 and in the immediate future will be \$130,000,000. The earnings in 1897 were \$8,000,000 and now are \$19,000,000. Since 1897 the earnings have increased 137 per cent, the investment 364 per cent and the population 49 per cent. In Cleveland

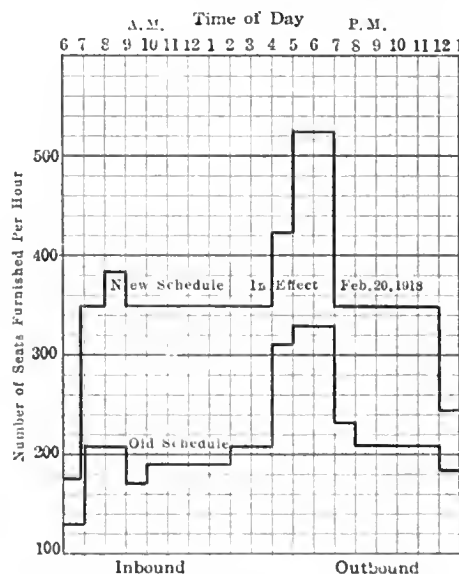
the average ride per passenger is 2.19 miles, compared with an estimated 4.4 miles at Boston.

Mr. Brush said that the so-called service-at-cost scheme as applied in Cleveland, Dallas and elsewhere, if properly developed and drawn would probably work for the Boston company. This plan creates a reciprocal relationship between the car riders and the public, a sliding scale of rates adjustable to yield a fair return, and only that, to the investor. By a fair return is meant one which will invite capital.

"Under no circumstances would an investor accept the public control bill as drawn by the Public Service Commission and now before the legislative committee," said Mr. Brush, in part. "You could not justify a banker or investor investing his money in an enterprise and then turning it over to five trustees at whose pleasure the property might be returned." It is estimated that a 6-cent fare in Boston would produce about \$3,500,000 additional revenue per year. To make higher fares successful, the public must be convinced that no matter what the service is, the people are getting what they are paying for under the circumstances. No group of four or five trustees can actually manage a property except through a competent chief executive. The speaker believes that the service-at-cost scheme will eventually restore public confidence in the property.

### More Service with Fewer Cars

ON FEB. 20, 1918, the Puget Sound Traction, Light & Power Co. substituted a one-man car service on its Summit Line for a two-man car service. The two-man cars formerly used were equipped with longitudinal seats, and each car had a capacity of twenty-six passengers. The new one-man car has a capacity, with



NEW SCHEDULE WITH ONE-MAN CARS REQUIRES LESS ROLLING-STOCK

cross seats, for thirty-five passengers. A somewhat higher schedule speed was put into effect so that ten of the one-man cars now are used during the rush period instead of eleven of the old style two-man cars, yet the seats per hour are forty-six per cent greater than under the old schedule. The accompanying diagram shows the new and old schedules.

## LETTERS TO THE EDITOR

### Heating Does Not Account for All the Winter Increase

ALBANY, N. Y., March 20, 1918.

To the Editor:

Suggested methods of reducing coal consumption on electric railways during the winter which has just passed have included programs for less heat on the cars, particularly during the peak hours. Considerable saving can undoubtedly be made in this way, but I wish to point out that exaggerated ideas of the amount of conservation thus to be effected are obtained when the consumption per car-mile or per ton-mile of energy in the summer and winter months is compared and the assumption is then made that the electric heaters are responsible for the difference. This assumption makes no allowance for the facts that it takes more energy to propel a car over a snow-covered track than over a clean one; that the wind resistance of a car closed is greater than when the sashes are down; that the number of stops and slow-downs, and therefore the energy consumption, is greatly increased when snow-cleared track is blocked by other vehicles; that frozen lubricant increases journal friction and that the car-lighting periods are much longer. That such allowances should be made is borne out by the records of companies which use devices for checking the motorman's use of energy for propulsion. These records usually show a rise in energy consumption following severe weather. Any company operating with coal stoves knows perfectly well that its energy per car-mile or ton-mile tends to rise as the temperature drops.

Another point which should be remembered in any analysis of the energy taken by electric heaters is that with a little care and oversight no heat need be wasted. Generally speaking, the average energy use of electric heaters during the winter months should be within

one-half of their rated capacity, even in long continued periods of cold. Where this is not the case, the responsible officials are not doing their duty in enforcing the "1-2-3" car heating order scheme. The difficulty of doing this has led to the more extended use of the thermostat as an energy saver, for it is not only automatic, but is also most sensitive to changes in car temperature.

From the foregoing it is fair to conclude that due allowance for other energy-using factors and the wiser use of the equipment will make the electric car heater much less of a fuel-eating bugaboo than it now appears to be.

W. S. HAMMOND.

### Transportation Engineers Needed

BOSTON, MASS., March 19, 1918.

To the Editor:

A great deal has been written about the increasing outgo and decreasing income of electric railways, particularly of the city railway with its 5-cent fare, diluted by transfers. I do not propose to discuss the political and economic reasons for this condition, but to consider what can be done by the operator along engineering and transportation lines to improve conditions.

It is almost inconceivable that until recently the number of transportation departments which carried on any traffic analysis could be counted on the fingers of one hand. In fact, one transportation superintendent who lost his job could not understand the reason given by the engineer-manager, namely: That he would not have in his employ a transportation man who would not learn how to read a traffic curve. Nevertheless, important as it is for the transportation man to know how to analyze traffic, he will fulfill only half of his functions unless he makes an endeavor to fit his equipment to the service needs which his traffic analyses disclose. The following are some considerations in traffic selection often overlooked:

Schedule speed is determined not so much by maximum speed as by such factors as height of floor and

**UNCLE SAM** wants the help of the men who run the cars and feed the boilers to save fuel. To aid in this campaign the Fuel Administration has sent to electric railway companies 20,000 of the poster shown at the left and 10,000 of the "extra shovelful" poster, shown at the right. The design and distribution of these posters were carried out with the co-operation of the War Board of the American Electric Railway Association.



**Gentlemen**

The UNITED STATES needs your help!

Be a fighting member of the fireman's army! You are boss of the coal pile and your fight is to save the coal to help the boys "over there." Your work is part of the war work of the country. Everything you save, especially coal, can be used somewhere else, to save and protect lives and preserve liberty.

**HOW YOU CAN HELP**

Inspect, adjust, and oil carefully. Properly adjusted and smooth running cars save power.

Turn off compressors and lights in idle cars. Do not burn lights or run shop and other motive except when necessary. Power used here is utterly thrown away.

Keep brakeshoes clear of wheels. There is no worse power thief on the railroad than a dragging brakeshoe.

Reduce car shifting to the absolutely necessary movements only.

Reduce coal used for heating by keeping shop and car doors shut.



**UNCLE SAM NEEDS THAT EXTRA SHOVELFUL**

Help Uncle Sam to Win the War by following these Directions:

1. Fire small amounts of coal often.
2. Keep fuel bed even by putting coal on thin spots. Avoid raking and dicing.
3. Keep fuel bed about six inches thick.
4. Look out for air leaks in brickwork.
5. Increase or decrease steam pressure by opening or closing draft dampers in regular.
6. Clean fire when the demand for steam is small, and while cleaning have the draft damper partly closed.

UNITED STATES FUEL ADMINISTRATION



**Conductors' and Motormen's Union**

*the UNITED STATES needs YOUR help.*

Be a fighting member of the firemen's army! You are boss of the coal pile and your fight is to save the coal to help the boys "over there."

**HOW YOU CAN HELP**

1. Get up to speed as fast and smoothly as safety and comfort of passengers will permit.
2. Coasting saves coal. Shut off controller and coast as far as possible before applying brakes.
3. It is seldom necessary to use current on down grades.
4. Bring car to a stop as quickly and smoothly as comfort of passengers will allow. With air brakes best results are usually had by making but one sufficiently strong application of air and then easing off.
5. Use judgment, when a vehicle is just ahead, and let car roll instead of feeding up controller.
6. Avoid skidding wheels. Avoid fanning air. Heavier air applications can be used at high speeds than at low speeds.
7. Save coal by economizing on light and heat.
8. The conductor's co-operation with the motorman in handling bell cord and passengers will mean getting the cars over the road with the least consumption of current.

THIS IS A REPRODUCTION OF THE POSTER WHICH THE FUEL ADMINISTRATION IS DISTRIBUTING FOR POSTING IN CAR CABS

steps, the width of platforms and aisles, the character of operation for doors and steps, employment of fare-collection devices that give quick, accurate collection, and so on. In short, schedule speed is determined not only by the propelling equipment, but by the equipment that hinders or hastens interchange of passengers at stops.

Second, a car should be of the type that will get the maximum travel during twenty-four hours. In the past we have scanned too closely the item of platform expenses. Cars have often been so large that operators have not run them on sufficiently short headway to get all the business. Whether the jitney stays or not, many people will walk a mile rather than stand ten to fifteen minutes waiting for a car.

Third, the equipment should be adequate to meet future needs. Only lack of credit justifies the purchase of equipment which makes no allowance for expansion. It is true that 40-hp. motors are cheaper than 50-hp. motors, but if the territory is growing, larger motors will be needed within four or five years because of the increased stops, so that the first cost of the large motor will often be justified purely on the grounds of higher rate of acceleration with lower maintenance cost.

E. W. HOLST.

### "Pull-Together" Order Distributed to Pennsylvania Railroad Employees

Every one of the 250,000 employees of the Pennsylvania Railroad System, both east and west of Pittsburgh, will receive an individual copy of Order No. 8, issued by William G. McAdoo, Director General of Railroads, calling upon the working forces of all lines to "pull together" in the National service and work unitedly to win the war. For this purpose the order has been reprinted, in small leaflet form, for distribution.

## AMERICAN ASSOCIATION NEWS

### Rhode Island Company to Organize Section No. 12

EMPLOYEES of the Rhode Island Company, Providence, R. I., plan to organize a company section in that city on April 9. Representatives of the American Association will attend in order to advise the employees as to the method of procedure which has been found satisfactory elsewhere.

### More Medals and Cash Prizes Awarded at Manila

AT THE thirty-sixth monthly meeting of joint company section No. 5, held at Manila on Jan. 15, medals were awarded for merit in papers presented before the section as follows: Gold medal to Francisco Santiago, chief meter inspector, for his paper on "Economic Influence of Electric Light and Power on the Industrial Philippines"; silver medal to Nicolas Tranfaglia, assistant superintendent track department, for his paper on "Co-operation", and bronze medal to F. P. Santiago, assistant claim agent, for his paper on "Accident Prevention." Cash prizes were also awarded as outlined in the following letter to each recipient, dated Jan. 15, 1918:

#### CONDUCTORS' AND MOTORMEN'S CASH PRIZE AWARD FOR PERFORMANCE OF DUTIES ACCORDING TO COMPANY'S STANDARDS OF SERVICE, YEAR ENDED DEC. 31, 1917.

In accordance with bulletin to employees dated July 20, 1917, providing that all conductors and motormen earning the distinction of "Excellent Service Employee" at the close of each calendar year, Dec. 31, be given cash prizes (Class A 30 pesos or \$15, Class B 20 pesos, Class C 10 pesos), as awards, based on the performance of their duties according to the company's standards of service, it affords the company great pleasure and satisfaction that you have been awarded a cash prize and to present you with a check in accordance with said award.

The award was made by a committee of nine, consisting of the superintendent of transportation, the assistant superintendent of transportation, a division superintendent, two inspectors, two conductors and two motormen, after a thorough investigation of their records for the year 1917 and a careful consideration of all of the circumstances in connection therewith.

On behalf of the company officially, as well as myself personally, I desire to congratulate you upon the award of the cash prize given you and to assure you that the company is proud of having in its service as faithful and loyal an employee as you have proved yourself to be and who has so well performed his duties according to the company's standards of service.

C. N. DUFFY,  
Vice-president and General Manager.

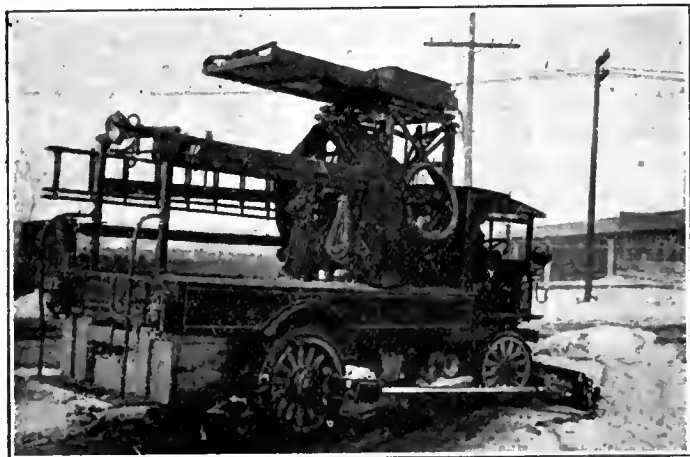
Still other cash awards were made to conductors and motormen as a result of a "conductors' and motormen's group accident prevention contest." In this the employees were divided into three groups, denominated respectively "red," "white" and "blue."

At the meeting Retiring President Santiago reviewed the work of the year, J. M. Bury read his inaugural address as president-elect, and other incoming officers spoke briefly. C. N. Duffy, general manager of the company, explained the purpose of the several awards and urged the members to make the most of the various competitions open to them.



## Line Truck Used for Removing Snow

MANY and ingenious have been the devices for removing snow from railway tracks and streets, and to some extent those adopted by any railway will depend upon local conditions. Snowplows and sweepers are, of course, essential for clearing the tracks of the heavier falls of snow. For lighter snow, however, and more especially for cleaning the points not directly on the railway track, the United Railways of St. Louis has



LINE TRUCK AT ST. LOUIS CLEARING SNOW FROM STREET

devised a type of equipment which seems to be both novel and efficient.

Some time ago a Garford truck chassis was purchased by this company and equipped in its own shops with a body comprising a pole-raising device and an adjustable tower for repairing trolley and feed wires. Recently the truck has been used as a snowplow.

A snowboard is attached by means of a rod on each side fastened to loose hubs on the rear wheels. The improvised plow rests on the ground and, to prevent side movement, is fastened to the front of the truck by



SAME TRUCK CLEARING SNOW FROM CAR TRACKS

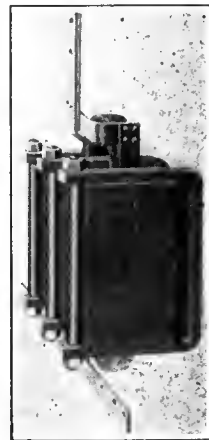
means of chains. The object in fastening the rods to the rear instead of the front hubs is to allow for inequalities in the surface of the pavement. To provide sufficient weight to hold the snowboard on the ground a heavy T-rail is laid across the top.

No figures as to the cost of construction or operation of the snowboard are available at this time, but the cost was amply low to justify the outlay. The truck shown here may be used for general utility work, pole setting, wire repairing, or snow cleaning, the equipment thus being kept in constant use.

## Track Impedance Bonds for Signal Circuits

THE impedance bond manufactured by the Union Switch & Signal Company, which is made up by assembling silicon steel laminations about a spirally wound coil of strap copper, has been improved by bringing the terminal connections for the rails out at the side in such a way that the cables will come between ties and be protected against dragging equipment.

The spiral winding of flat or strap copper allows for satisfactory insulation between turns, and at the same time provides a sufficient surface for dissipation of heat. The two windings are so arranged as to neutralize any mechanical stresses due to surges of propulsion current. Rail cables can be connected without removing the bond cover. A sloping cover also provides for protection against dragging equipment.

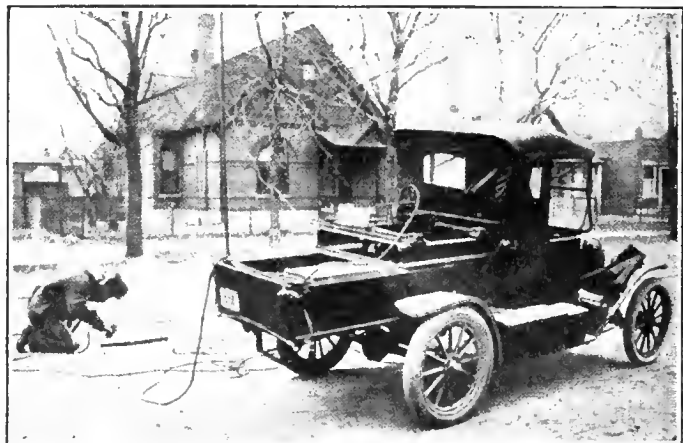


IMPROVED TRACK IMPEDANCE BOND

## Increasing the Usefulness of Bonding Equipment

ONE of the most handy arrangements of the Lincoln bonding outfit which has recently come to notice is that in use by the Denver (Col.) Tramway. As shown in the accompanying illustration, this machine mounted on a Ford automobile makes a very satisfactory emergency outfit for the repairing of all open rails and similar welding work, when car service cannot be delayed.

The New Brunswick (Canada) Power Company fur-



THE FORD MAKES BONDING EASY

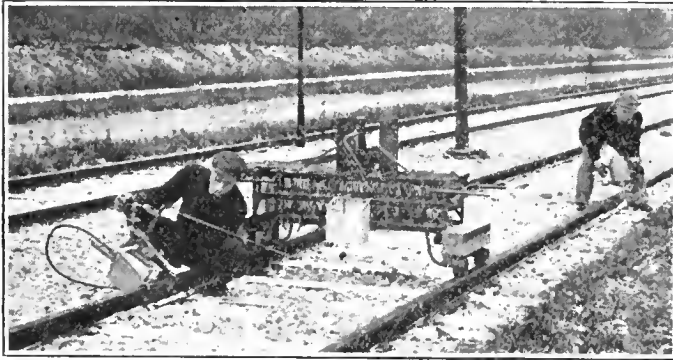
nishes another example of increasing the usefulness of bonding outfits. Instead of putting its Lincoln bonder away for the winter this company uses it daily in the shops at welding armatures, bearings, etc., thus making the machine earn dividends twelve months a year.



## A 140-Lb. Welding Outfit for Rail Bonds and Arc Welding

**A**LTHOUGH the 140-lb. combination portable welder rheostat of the Electric Railway Improvement Company, Cleveland, Ohio, has already been successfully installed on a number of railways, for rail bonding and arc welding, particulars of its operating principles and construction have not been made available until now.

The standard outfit will operate on any voltage between 250 and 750. The welder weighs 65 lb., and consists of an inclosed furnace box with a graphite plate



PORTABLE WELDER IN USE FOR RAIL BONDS

on the front side. The carbon electrode enters this box through an opening in the rear, and the heating is produced by drawing an arc between the carbon electrode and graphite plate. The furnace box is further surrounded with a magnetic coil which is in series with the line and which focuses and directs the arc. For bond welding the apparatus will draw from 75 to 100 amp. from the line and consumes from 1½ to 2 kw.-hr. per No. 0000 bond. The actual time of welding is about one minute per terminal on a No. 0000 bond.

For rail bonding the power is taken directly from the trolley wire, with the rheostat and welder in series.



PORTABLE WELDER IN USE AS AN ARC WELDER ON SPECIAL WORK

The rheostat is used to regulate the heating by producing the proper voltage for the welder. For arc welding the power is taken from the trolley wire through the rheostat to the metal pencil.

The rheostat is provided with thirteen parallel paths, all tied together at the busbar. Four of these paths are permanently connected to the main switch. Each of the remaining nine paths connects with the main switch through a "cut-in" switch. Each path gives approximately 15 amp. at 600 volts, thus 60 amp. is the

lowest current obtainable at that voltage. By throwing in "cut-in" switches, the current can be brought up to full load of 195 amp. in steps of 15 amp. each.

The rheostat is also provided with three "cut-in" switches connected to the busbar. The purpose of these switches is to cut out part of the rheostat to compensate for a decreased line voltage.

## Progress on the Toledo Power Plant

**T**HE new Acme power plant of the Toledo (Ohio) Railways & Light Company has been completed to a point where it is ready to furnish current for both light and power to the system which has heretofore been depending upon the Water Street plant alone. One turbo-generator of 20,000-kw. capacity has been installed and the plans call for two more generators, the combined capacity of the three, together with that of the old power house, being 200,000 kw. This is sufficient for a city many times larger than Toledo, but provision has been made not only for the growth of the city, but for the development of the use of electric power and the increase in the operation of the local and interurban lines.

The plant is located in what is known as East Toledo, on a plot of forty-two acres. Of this about a third is high ground, while the remainder lies below the level of the Maumee River. This is to be filled and developed as needed.

Three buildings of reinforced concrete, steel and brick construction have been practically completed. Eight boilers are ready for operation and a complete automatic stoker system has been installed. Coal is carried to the bunkers by a belt conveyor from pits outside at a speed of 150 tons an hour, if necessary. A submerged storage system, which is to have an ultimate capacity of 200,000 tons, is being constructed. It will consist of four pockets, of 50,000 tons each, and one will be completed at once. The bottom of the pockets is 20 ft. below the lake level and the top is 10 ft. above. They are of concrete construction.

A reinforced concrete trestle on wood piling carries the necessary railway tracks. It is so arranged that twenty cars of coal can be dumped at one time, directly into the storage pits. Coal is stocked and reclaimed by a 160-ft. crane, which has a capacity for stocking from the tracks to the center of the pits at about 250 tons per hour, and for reclaiming at 150 tons per hour.

Three large tunnels connect the plant with the river. They are 9 ft. high, 9 ft. wide and 500 ft. long, and each has a capacity of 400,000 gallons per minute. Two will be used for intake purposes and the third for discharge. The tunnels are 22 ft. below the lake level.

G. W. Saathoff, engineer with the Henry L. Doherty Company, superintended the construction of the new plant. Others who have been identified with it are Fred J. Derge, William Long, M. R. Bump, E. J. Billings, J. R. Ruggles, J. M. Strike and engineers with the Bentley & Sons Co.

The recent winter has been unusually severe in its effect of causing flat spots on car wheels. In December the mechanical department of the Detroit (Mich.) United Railway reground 379 pairs of wheels and placed 397 new pairs on axles, making a total handled of 1552 during the month.

# News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

## How to Join Army Engineers Men Trained in Engineering Can En- gage in Their Specialty by Joining Replacement Regiment

The Kaiser has placed the keenest engineering talent of his own and allied empires into the Imperial armies of the Central Powers to defeat the world. During these last three years the best engineering skill of France, Great Britain, Russia and Italy and their allies has been matched against the enemy. Up to this time voluntary enlistments of the high-class technical men in the United States Army are below requirements. This deficiency is probably due in part to the lack of proper information concerning the engineering branch of the service.

### FIRST REPLACEMENT ENGINEERS

An important factor in keeping up the engineering strength of our army in the future will be the First Replacement Regiment of Engineers, which was organized at Washington Barracks, D. C., on Dec. 14, 1917, with the express idea of accomplishing this end. This regiment has not only the responsibility of finding men to fill up depleted ranks, but it must also fit them to step into the work of trained, efficient and disciplined soldiers.

The preliminary work of the recruit is first a thorough training in military drill. Drills gradually give way to engineer work and specific technical training. The engineer soldiers must know how to tie all the important kinds of knots and lashings, to build spar and truss bridges, to construct revetments, dig trenches, place wire entanglements, construct machine-gun emplacements, build pontoon bridges and to construct roads. They must also know the methods of demolition, sapping and mining. Specialized training in lithography, zincography, surveying and other branches are also given to those qualified for further training.

### WIDE RANGE OF WORK

Engineers are called upon to perform such a wide range of work that practically every man with any technical training or mechanical ability can find a place in this organization. Every male citizen in the United States who is physically fit, and between the ages of eighteen and twenty-one, and thirty-one and forty, is eligible to join the regiment by voluntary enlistment.

To be assured of assignment to this regiment, the applicant for enlistment should write to the Commanding Officer, First Replacement Regiment Engineers, Room 107, Headquarters Building, Post of Washington Barracks, D. C., for application blank. If the

blank shows the man to be eligible, an enlistment card is filled out and sent to the recruiting officer nearest to the applicant's place of residence, with instructions to enlist the man for service in this regiment. Transportation and means will be furnished by the recruiting officer, and the man will be instructed to report at the post for duty.

## Avoid Unnecessary Work

California Commission Thinks Utilities  
Should Not Be Bound by Franchise Requirements

The Railroad Commission of California, upon its own initiative, has been conducting an investigation into the transportation system of that State during the emergency created by the war. It recently announced several recommendations which it directed to be called to the attention of interested parties.

Most of the suggestions have to do with the problems of steam operation, but one directly concerns electric railways and other utilities in California. It deals with franchise requirements, and the opinion of the commission is summed up thus:

"State, county and city governmental authorities should not require utilities, during the present emergency, to live up to franchise requirements which call for improvements, street work, etc., that is not absolutely necessary for operation. Moreover, all public improvements not necessary in the prosecution of the war should be deferred so that the labor and materials may be available for railroads or other necessary war work."

Commenting upon this point the commission said:

"Steam, electric interurban, and street railways, as well as other public utilities, should not be required at this time to live up to such of their franchise stipulations as necessitate otherwise uncalled for new construction, such as street paving in cities, replacement of existing T-rail with more expensive girder rail, and similar items. The latter suggestion will, of course, have its effect also on maintenance and capital expenditures and consequently on the net earnings of the carriers."

"We recommend that the commission address the appropriate state, county and city governmental authorities, inviting their co-operation with the program. We also suggest that the commission offer its informal assistance in cases where, by reason of franchise requirements, a city insists upon construction work which is not essential and which would appear to interfere with the more important railroad work."

## New Franchise Suggested

Company at Norfolk Submits Proposal  
for Thirty-Year Grant With New  
Tax and Paving Provisions

The Virginia Railway & Power Company has submitted to the business men's traction committee at Norfolk, Va., a proposition embracing a general scheme of rerouting, skip stops, new franchises and taxation, the development of which to final completion would require several years, and with the shortest possible relief, outside of the skip-stop feature, not to be effective for less than four months.

Two new franchises are suggested, each to run for a period of thirty years. One of them embraces the Norfolk Railway & Light Company's railway system and electric lighting system, and the other, in the name of the Virginia Railway & Power Company, takes care of the various other electric railways not embraced in the Norfolk Railway & Light Company's system.

### TAX IN LIEU OF OTHER PAYMENTS

Under present regulations the company pays a tax of 6 per cent on its gross receipts in the city and also must pay for the paving of all streets between the tracks and for 2 ft. on each side of the tracks. In lieu of this the company proposes a tax of 4 per cent on its gross receipts not only in the city but from all service outside the city east of the southern branch of the river, taking in the Ocean View and Terminal lines.

T. S. Wheelwright, president of the company, presented the proposition for his company, and after reading a prepared statement, submitted five separate plans for improving electric railway service in Norfolk. After discussing the paving and tax questions to which reference has just been made, Mr. Wheelwright said:

"As to the matter of railway fares, the 5-cent fare is now considered the minimum compensation for this service, especially in view of the fact that more than 100 electric railway systems throughout the country have been granted fare increases above the 5-cent fare and many other applications are now pending for an increase over this amount."

"As to the 2½-cent school tickets, while the service rendered to school children costs quite as much as for any other passenger, the policy of the company has always been in the direction of being liberal on this point. The original provision for 2½-cent tickets for school children was limited to public schools or such schools as do not make a charge for tuition, and the understanding is that school tickets shall

## Valuation Commission for Pittsburgh

Railway, City, Surrounding Boroughs and Public Service Commission  
All Represented on New Valuation Body

A commission of five engineers, one representing the city of Pittsburgh, one representing the boroughs surrounding that city, two representing the Pittsburgh Railways and the fifth, the chairman, representing the Public Service Commission of Pennsylvania, has been selected to direct a valuation of the property of the Pittsburgh Railways. This is in accordance with the decision of the Public Service Commission in connection with the case against the railway growing out of the new fares put into effect by the company on Jan. 22. The members of the commission are as follows:

F. Herbert Snow, chairman, chief engineer of the State Public Service Commission.

Robert M. Feustel, member of the firm of Sloan, Huddle, Feustel & Freeman, consulting engineers of Chicago and Boston, representing the city of Pittsburgh.

George Warren Fuller, New York, member of the firm of Fuller & McClintock, representing the boroughs.

Morris Knowles, Pittsburgh, chief engineer in charge of housing for the United States Shipping Board, under whose direction the filtration plant at

Aspinwall was built, representing the Pittsburgh Railways.

J. A. Emery, New York, appraisal manager of Ford, Bacon & Davis, representing the Pittsburgh Railways.

It is expected that the members of the commission will sit on Thursday and Friday of each week.

### CAREERS OF THE ENGINEERS

The work done previously by Messrs. Snow, Feustel and Emery is more or less well known to the readers of the *ELECTRIC RAILWAY JOURNAL*. With Messrs. Fuller and Knowles, however, the case is somewhat different. For this reason there follows a summary of their activities:

Mr. Fuller is a graduate of the Massachusetts Institute of Technology, and for fifteen years has been engaged in valuation work, principally of water companies. He spent several years in Cincinnati and Louisville in charge of works for the purification of the Ohio River water supply to these cities. He has been adviser on the water supply of New York, New Haven, Paterson, N. J.; Washington, D. C.; Buffalo, Columbus, Indianapolis and New Orleans, and has been on the city side in valuation and other cases.

Mr. Knowles was chief engineer of the Pittsburgh city bureau of filtration, 1901-10, in which time the Aspinwall filtration plant was placed in successful operation. He has been engaged for years in private practice as a consulting engineer, and now is in charge for the Shipping Board of its plan for housing shipyard workers.

Chairman Ainey of the Public Service Commission said at one of the sessions at which the fare in Pittsburgh was under discussion:

"The only way to establish what is a reasonable rate of fare is to find what fare would yield a just return on the money invested, and the only way that can be done is by taking an impartial valuation of the properties of the company."

### St. Louis Bill Up March 22

The board of Aldermen of St. Louis, Mo., decided on March 15 to postpone action on the United Railways "compromise" bill until March 22, when the bill, with the amendments ratified by the board of public service, will be made a special order of business before a committee of the whole, after the regular meeting.

The principal amendments to the aldermanic bill recommended by the board of public service, after two months' consideration, are the reduction of the tax on gross earnings from 3 per cent as originally proposed to one-half of 1 per cent, thus reducing the tax from approximately \$480,000 a year to approximately \$65,000; permitting the company to pay the accrued mill tax, amounting to approximately \$2,300,000,

in ten annual payments without interest, instead of in five annual payments; allowing the company twelve months instead of nine in which to accept the "compromise," unless the war ends before that period expires; and, if it does, the company to file its acceptance of the ordinance within six months of the end of the war; and permitting a change in the \$60,000,000 valuation to any valuation fixed by the State Public Service Commission.

## Community Ordinance In

Sponsors of Toledo Grant Think Presentation of Measure Now to Be Ill-Advised

The community plan ordinance was introduced in the City Council of Toledo, Ohio, on March 12, by Councilman Irwin. It was referred to the street railway committee. This action seems to have been a surprise to the members of the commission which formulated the ordinance. The *Toledo News-Bee*, of which Commission Cochran is editor, said that the draft is incomplete. The *Toledo Blade*, edited by Commissioner Wright, contends that the ordinance was forced into Council. Member Thurston advances the idea that the introduction of the measure was the work of some one who is adverse to the ordinance. The *Toledo Times* asks the commissioners what they expected would be done with the ordinance if it was not to be put before the people for discussion.

It is said that the ordinance makes no provision for a valuation of the property, although a valuation must be made before negotiations could be completed for assumption of control by the proposed new community traction company. The question is asked as to who will make this valuation. It is supposed that Council will have to make provision for this and other things that must be done, in the event that the ordinance meets with approval. There must be a referendum vote after Council has acted on the draft.

## \$100,000,000 Chicago Program Advanced

The local transportation committee of the City Council of Chicago, Ill., on March 20 concurred with the recommendation of the Traction & Subway Commission's physical plan for the immediate construction of three subways and four elevated line extensions. This would provide a complete revolution of local transportation, increasing the rapid transit facilities 150 per cent in the first six-year period. The new plan would serve 60 to 70 per cent of the population with rapid transit where now 20 per cent is served. The program involves the expenditure of more than \$100,000,000. The money is at hand. A sub-committee has been appointed to draft an ordinance and submit it to the local committee at an early date. This sub-committee will designate the length of the franchise.

(Concluded from page 581)

apply only to pupils under eighteen years of age attending institutions where no tuition is charged, and upon proper certification that they are entitled to such transportation.

"The rates for light and power recommended are the same as those filed with the State Corporation Commission and in effect in Richmond, Petersburg and other divisions of the system. They are worked out on the block system and are more favorable than the present prevailing rates for retail light and power in Norfolk.

"The matter of increase or decrease in the electric railway fares and increase or decrease in the light and power rates to be left open after a period of ten years for decision by the State Corporation Commission, as was recommended by the committee and approved in the previous franchise.

"Much of this work has been carefully studied and outlined in the franchises previously recommended by the joint committee and which will be of great value in facilitating an early and definite disposition of the whole matter.

"It is our understanding that whatever plan is now agreed upon will be supported by the citizens of Norfolk and recommended by them to the Council, and when the matter is brought up for consideration by our board of directors, it will have our recommendation and support; all legal questions, of course, to be subject to the approval of the general counsel of our company and the city attorney of Norfolk."

## News Notes

**Commission Membership Increased.**—Governor Edge of New Jersey has signed the bill to increase the membership of the board of Public Utility Commission from three to five.

**Merchants Oppose Municipal Ownership.**—The directors of the Merchants Association of New York have entered a protest against the passage of bills now pending in the New York State Legislature authorizing municipal ownership and operations of public utilities.

**Springfield Men Receive an Increase.**—The Springfield (Ohio) Railway has announced an increase of 1 cent an hour in the wages of motormen and conductors, effective on April 1. The schedule ranges from 27 cents for one-year men to 31 cents for men who have been in the service four years.

**Bill Taxing Gross Incomes Signed.**—Governor Edge of New Jersey has signed Assembly Bill No. 69, which provides for a tax on the gross income of electric railway, gas and electric corporations, instead of the personal property assessment that prevailed previously. The law is to become operative on Oct. 1 next.

**Joplin Strike Ended.**—The strike of the employees of the Joplin & Pittsburg Railway, Pittsburg, Kan., has ended and the men have returned to work after having been out for one month. It is said that the international officials of the union held that the men had no right to refuse to work under a contract which they had accepted and signed and that the men must live up to the contract.

**Strike in Waco.**—Conductors and motormen, to the number of 110, employed by the Texas Electric Railway in the operation of the local lines in Waco, Tex., went on strike at midnight of March 9, following rejection of their demands by A. J. Bush, Jr., assistant general manager of the railway and general superintendent of the Waco lines. The men demand recognition of the union and a basic nine-hour day with time and one-half for overtime.

**Bought Thrift Stamps.**—Many of the patrons of the Pittsburgh (Pa.) Railways who received the rebate on the excess night fares are said to have bought War Savings Stamps with the money which was returned to them. The amount invested in this way is estimated to have been more than \$35,000. James Francis Burke, director of savings in Western Pennsylvania, made the suggestion about this use of the rebates to the benefit of the government.

**City Representatives Inspect Railway.**—Members of the street railway

committee of the City Council of Cleveland, Ohio, made their annual inspection of the property of the Cleveland Railway on Feb. 21. Councilman Stanard is the new chairman of the committee. Charles H. Clark, superintendent of maintenance of way of the company; Paul E. Wilson, secretary to J. J. Stanley, president of the company, and Fielder Sanders, Street Railway Commissioner of the city, accompanied the members of the committee.

**Conference on Daylight Saving.**—Operating managers of the various transportation companies in the city of New York notified the Public Service Commission at a conference on March 20 that they anticipated no difficulty in conforming to the daylight saving plan. Each company will turn the hands of the clock ahead one hour at 2 a.m. on March 31. The managers did not see any necessity of changing the present rush-hour schedules. As the change will take place on Sunday morning, it will help the public in getting used to it before a work day begins.

**Railway Dragged Into Politics.**—Roy Smock, the first city railway supervisor under the franchise secured by the Des Moines (Ia.) City Railway, is without desire on his part playing an important part in the city campaign which is now on. Steve Hill, styled by many as the Chamber of Commerce candidate for Mayor, charges that Mr. Smock has been favorable to the interests of the Des Moines City Railway to the detriment of the interest of the city, and states openly that if elected one of his first acts will be to discharge Mr. Smock.

**Seek to Amend Vestibule Bill.**—A bill to amend the public service commission's law in relation to inclosing the platforms of street cars has been introduced in the Assembly and referred to the committee on railroads. The new section, as amended, would read as follows: "Power of commission to order street car platforms inclosed. The commission having jurisdiction shall, after a hearing either on its own motion or on a complaint, have power to make an order compelling the inclosing or vestibuling of all platforms on street cars for the safety and comfort of the employees and public, operated in any city of over 450,000 inhabitants upon any line or lines of street railways therein."

**Increase in Wages Asked in Hamilton.**—The conductors and motormen employed by the Hamilton (Ont.) Street Railway, whose agreement expires on April 1, have asked the company for an increase of wages of 12 cents an hour over the present schedule, and for other concessions. The new rates requested are: First year men, 36 cents an hour; second year men, 38 cents an hour; three years and over, 42 cents an hour. The men also ask time and a half for overtime and legal holidays, double time for Sundays, 25 cents a day extra for training beginners and operating snow sweepers. They also want free uniforms for men who have served more than a year.

**M. O. Path in Tacoma Not Easy.**—Members of the City Council of Tacoma, Wash., see a possibility of the Federal Board of Investments refusing to sanction a bond issue at the next spring election for the purchase by the city of Tacoma of the Tacoma Railway & Power Company's system, as proposed by Commissioner C. D. Atkins. Mayor Fawcett is opposed to purchase of the traction system, suggesting as an alternative that the city condemn portions of the property as the company's franchises expire within the next few years. The other members of the Council consider the Mayor's plan to be faulty, in that it would take years for the city to acquire the system by the condemnation method outlined.

**Motorman Sentenced for Reckless Driving.**—One of the few cases in which a motorman has been sent to the penitentiary in connection with accidents in which life was lost is that of Fred West, who was received at the Indiana Reformatory, Jeffersonville, Ind., on Feb. 19, from Indianapolis, to serve a term of from two to twenty-one years for involuntary manslaughter. On Aug. 12, 1917, a car operated by West ran off the tracks at College and Fairfield Avenues and overturned. A number of persons were injured and several were killed. An indictment was returned charging West with operating his car at excessive speed in violation of a city ordinance. West pleaded that his brakes refused to hold and that he was unable to control the car.

**Another Hearing on Chicago Program.**—A public hearing was held in the City Council chamber in Chicago on March 13 on the program outlined by the local transportation committee for the solution of the traction problem. Chairman Capitain and G. T. Seely, assistant general manager of the Metropolitan West Side Elevated Railway, Northwestern Elevated Railroad and the South Side Elevated Railroad, explained the plans in detail. A number of representatives of improvement associations also spoke, most of them desiring extensions of rapid transit lines into remote territory. There was also some objection to building a two-level elevated structure on one of the downtown streets. The committee took all these matters under consideration and will hold another meeting at an early date.

**Asks Mayor to Be Accurate.**—Mayor Hylan of New York uses the Brooklyn Rapid Transit lines to reach the City Hall. He is impatient of delays such as the regular operation of a railroad impose at times, and in several instances has scored the company unjustly. One of his habits is to use figures carelessly. For this he has already been called to account by Chairman Straus of the Public Service Commission. On March 14 Acting Chairman Whitney of the commission felt it incumbent upon him to write the Mayor about his besetting sin. Mr. Whitney said in conclusion: "In view of the facts it must be again apparent to you that your statement that the B. R. T.



has thirty-two fewer cars in operation now than in 1917 or 1913 is not justified by the facts, and in all fairness should not be repeated."

## Programs of Meetings

### National Lumber Manufacturers' Association

The National Lumber Manufacturers' Association will hold its sixteenth annual meeting at the Congress Hotel, Chicago, Ill., on April 8-9.

### New England Street Railway Club

The banquet committee of the New England Street Railway Club announces that on March 25 seat assignments will close for the eighteenth annual meeting and banquet of the club, to be held at the Copley-Plaza Hotel, Boston, on March 28. The speakers are Thomas N. McCarter, chairman of the war board of the American Electric Railway Association and president of the Public Service Railway, Newark, N. J., and John W. Weeks, Senator from Massachusetts.

### Wisconsin Electrical Association

The program has been announced for the tenth annual convention of the Wisconsin Electrical Association at the Hotel Pfister, Milwaukee, on March 27 and 28. The opening of the session at 9.30 a. m. on March 27, will be followed by the address of the president. The afternoon session will be in conjunction with the Wisconsin Gas Association. A joint convention dinner will be held in the Fern Room of the Hotel Pfister on the evening of March 27, at 7 o'clock.

The program of the papers for March 27 follows:

"Depreciation in Connection with Public Utilities," by Edwin S. Mack, of Miller, Mack & Fairchild, Milwaukee, Wis.

"Public Regulation of Public Service Companies," by John H. Roemer, formerly chairman of the Railroad Commission of Wisconsin.

"The Presentation of a Case Before a Public Service Commission," by Harold L. Geisse, secretary of the Railroad Commission of Wisconsin.

The program of the papers for March 28 follows:

"The Utilities and the War," by M. C. Ewing, secretary-treasurer of the Wisconsin Valley Electric Company, Wausau, Wis.

"Metal Electrode Welding," by Dean Treat, manager of the Wisconsin Railway, Light & Power Company, La Crosse, Wis.

"Increasing the Efficiency of Hydro-electric Plants," by Daniel W. Mead, of Mead & Seastone, consulting engineers, Madison, Wis.

"Three-Phase Four-Wire Distribution," by George E. Wagner, superintendent of plant of the Madison Gas & Electric Company, Madison, Wis.

In addition to the papers on March 27 there will be an address by W. N. Fitzgerald, State Fuel Administrator for Wisconsin.

# Financial and Corporate

## British Columbia Meeting

**£44,000 Transferred from Reserve Fund to Meet Dividends—Net Gain of £26,000 for Year**

At the annual meeting of the British Columbia Electric Railway, Ltd., Vancouver, B. C., it was announced that the net income of the company for the year ended June 30, 1917, was £160,844. After adding the preceding year's balance and transfers, and deducting interest on debentures and debenture stock and dividends already paid on the 5 per cent cumulative perpetual preference stock, there remained a balance of £7,032 to be carried forward. In order to meet the dividend payments accounted for it was necessary to transfer £44,000 from the reserve fund. The figures given represent an improvement of approximately £26,000 over the previous year's results.

It was stated at the meeting that for the first four months of the current year the gross earnings showed an increase of approximately £29,400. This increase, however, was more than absorbed by increased expenses due to higher wages and increased cost of materials. As a consequence, the net earnings showed a decrease of £520.

Owing to the uncertain outlook for the immediate future, the directors felt it prudent to postpone the payment of the interim dividend payable on Jan. 15, 1918, on the 5 per cent cumulative perpetual preference stock. If at the end of a financial year an improvement in operating results is shown, however, the whole or part of the dividend may be distributed next July.

## Spokane Valuation Hearing

**Washington and Idaho Commissions Begin Hearings to Fix Rate-Making Values**

Hearings were held for two days recently before the Public Service Commission of Washington and the Public Service Commission of Idaho to fix a valuation on which will be based the new rates to be charged by the Washington Water Power Company, Spokane, operating 110 miles of electric railway. At the outset the company objected to the Public Service Commission of Idaho fixing rates on power developed in Washington. The company contended that this was beyond the jurisdiction of the Idaho commission.

J. S. Simpson, an engineering accountant for the Washington commission, told how the company had grown from a corporation with an investment of \$235,000 in 1889 to one with nearly \$25,000,000 at the end of 1916. He said that there was a dollar of actual investment for every dollar of outstanding stock or indebtedness.

All matters pertaining to the affairs

of the Washington Water Power Company in Idaho were asked to be separated from the Washington figures by the Idaho commission. Mr. Simpson promised to see that this was done.

Attorney Post for the company served notice on the joint commission that he will ask that the valuation be based on the level of 1917 war prices rather than on the five-year average ended Dec. 31, 1916.

Chairman Blaine of the Washington commission thought it was impractical for the commission to base its valuation on the abnormal prices prevailing since the war began. The commission had followed the plan of averaging costs for a period of five years and basing its valuations accordingly. He thought the commission, when considering the cost of operation, would take into consideration the increased cost of labor and operating material.

The cost of reproduction fixed for the company's property follows:

Property in Washington.....	\$21,625,969
Property in Idaho .....	2,492,815

Total .....	\$24,118,784
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PROPERTY IN WASHINGTON	
General office buildings.....	\$295,073
Power plants .....	6,993,897
Railway system .....	5,664,512
Storage battery .....	178,338
Transmission lines .....	1,047,236
Rural extensions .....	79,580
Telephone lines .....	98,198
Substations .....	1,492,281
Distribution system .....	2,903,210
Miscellaneous property.....	302,681
Pole line easements.....	29,916
Working capital .....	115,200
Lands .....	1,531,992

Total .....	\$20,732,114
Non-operating property.....	893,855

Total .....	\$21,625,969
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POWER PLANTS IN WASHINGTON	
Monroe Street power plant.....	\$681,019
Little Falls .....	1,943,711
Long Lake .....	4,369,167

Total .....	\$6,993,897
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The hearing will be continued on April 8.

## Ten Per Cent Gain in Ottawa Operating Net

The net earnings from operation of the Ottawa (Ont.) Traction Company for the calendar year 1917 amounted to \$535,289 as compared to \$484,564 in the year preceding. The increase, therefore, was \$50,724, or 10.4 per cent. The gross receipts in 1917 totaled \$1,240,627 as compared to \$1,154,912 in 1916. The total expenses, including mileage payments, taxes and interest, were \$830,961 in 1917 and \$776,587 in 1916.

The usual quarterly dividends of 3 per cent were paid during the year, and a bonus of 3 per cent. The reservation for depreciation was \$110,000. The balance to the credit of profit and loss account at the end of the year was \$267,590. A total of 29,347,692 passengers were carried in 1917, as compared to 27,033,778 in 1916, an increase of 2,313,914.



# I. T. S. Shows Revenue Needs

## Detailed Exhibit Presented to Illinois Commission to Support Petition for Emergency Rates

The principal exhibit of the Illinois Traction System, Peoria, Ill., in the emergency rate case now pending before the Public Utilities Commission, consists of a series of compilations showing the company's financial condition. Previous references to the hearings on the company's blanket application for increased rates on fourteen city railway, electric and gas properties were made in the *ELECTRIC RAILWAY JOURNAL* of Feb. 23, page 389, and March 9, page 479.

### WHAT THE EXHIBITS SHOWED

The exhibit was submitted in two sections, each one containing compilations for each class of petitioning service and for certain combinations of classes and all classes combined. Part I showed the average earnings and expenses and the average return received by each property during 1914, 1915 and 1916 (the three pre-war years). It also showed the earnings and expenses as estimated for 1918, on the assumptions that the rates remained without

properties on Jan. 1, 1918, was put at \$22,684,818. This figure was obtained by totaling actual prices paid, as shown by cost vouchers. The average amount available during 1914-1916 for depreciation and return was \$2,122,141, or 10.31 per cent. Under 1917 conditions as regards rates and business, and with prices in effect in December, 1917, the amount available for depreciation and return in 1918 would be \$1,505,871, or 6.64 per cent. With business the same as in 1917 and prices continuing the same as in December, 1917, but with rates increased as proposed, the amount available for depreciation and return in 1918 would be \$2,140,533, or 9.38 per cent.

### Application Made for Receiver

Chancellor Walker has signed an order requiring the Trenton, Lakewood & Seacoast Railway to show cause at Long Branch, N. J., why a receiver should not be appointed for the company. The order carries with it a preliminary injunction restraining the company from disposing of any of its assets pending the receivership application, which is made by Frank Tilford, New York, a bondholder. The company

## 1917 Returns for York

Gross Earnings Increased 8.7 Per Cent, but Operating Expenses Increased 22 Per Cent

Although increased travel brought about a wholesome improvement in revenues for the York (Pa.) Railways during the year ended Nov. 30, 1917, the cost of transportation showed a preponderating increase. The gross earnings in 1917 totaled \$1,051,472, an increase of \$83,975 or 8.7 per cent over those for the preceding year. Operating expenses and taxes, however, rose \$118,565, or 22 per cent, to a total of \$655,873. The expenses included an item of \$60,161 for depreciation, an increase of \$19,620.

The net earnings at \$395,658 represented a decrease of \$34,589. The payments for interest and bond discount showed a small decrease, however, and as a result the net income fell off \$27,154 or 15.8 per cent, to a figure of \$144,018. The surplus balance on hand on Nov. 30, 1917, amounted to the sum of \$240,813.

### CONSTRUCTION CURTAILED

Owing to high cost, the difficulty of obtaining equipment and the desire of

FINANCIAL DATA COVERING ONLY THE CITY RAILWAY DEPARTMENTS OF ILLINOIS TRACTION SYSTEM

	Three Year Average Operation 1914—1915—1916					Estimated Operation—1917 Business and Rates, with Prices Prevalent at End of 1917				Estimated Operation—1917 Business and Rates Adjusted to Proposed Rates, and Prices Prevalent at End of 1917			
	Gross Operating Revenue	Expense and Taxes	Available for Depreciation and Return		Fair Value Jan. 1, 1918	Actual Revenue, 1917	Estimated Expense and Taxes	Available for Depreciation and Return		Earnings Under Proposed Rates	Estimated Expense and Taxes	Available for Depreciation and Return	
			Amount	Per Cent				Amount	Per Cent			Amount	Per Cent
Jacksonville Ry. & Lt. Co. ....	\$48,944	\$34,053	\$14,891	6.29	\$243,876	\$44,509	\$33,766	\$10,743	4.40	\$50,860	\$33,766	\$17,094	6.77
B. & N. Ry. & Lt. Co. ....	202,021	127,632	74,389	6.84	1,116,060	183,363	163,709	19,654	1.76	203,963	163,709	40,254	3.61
Caro Elec. & Trac. Co. ....	57,388	38,358	19,030	8.99	274,300	52,234	45,947	6,287	2.29	62,154	45,947	16,207	5.91
Danville St. Ry. & Lt. Co. ....	213,397	111,271	102,126	9.39	1,113,800	248,618	195,395	53,223	4.78	252,618	195,395	57,223	5.14
Decatur Ry. & Lt. Co. ....	216,851	123,676	93,175	11.21	804,500	238,943	161,122	77,821	9.67	245,243	161,122	84,121	10.45
Galesburg Ry., Lt. & Pr. Co. ....	149,709	102,616	47,093	6.45	846,000	141,216	123,230	17,986	2.12	147,916	123,230	24,685	2.92
Northern Ill. Lt. & Trac. Co. ....	41,952	30,788	11,164	8.36	145,820	28,117	18,600	9,517	6.52	28,117	18,600	9,517	6.52
Peoria Ry. ....	733,731	523,149	260,582	12.18	2,477,470	859,670	665,617	194,053	7.83	932,670	665,617	267,053	10.78
Quincy Ry. ....	208,408	128,625	79,783	7.68	1,044,000	213,821	149,885	63,936	6.12	225,021	149,885	75,136	7.20
Urbana & Cham- paign Co. ....	146,307	84,453	61,854	11.53	554,000	145,704	101,688	44,016	7.95	149,204	101,688	47,516	7.27
Total .....	\$2,068,708	\$1,304,621	\$764,087	9.62	\$8,619,886	\$2,156,195	\$1,658,959	\$497,236	5.74	\$2,297,766	\$1,658,959	\$638,807	7.62

change during the year, that the business continued approximately the same as in 1917, and that the prices of coal, oil, labor and materials prevalent in December, 1917, continued in effect. Part II differed only in that it showed the estimated earnings for 1918 under the proposed higher rates.

The accompanying table shows the data submitted for the railway departments of the various properties. The tables from Part I and Part II have been combined to avoid the repetition of the first five columns. With business the same as in 1917 and prices the same as in December, 1917, the railway departments would show \$497,236, or 5.74 per cent, available for depreciation and return under 1917 rates, and \$638,807, or 7.62 per cent, under the proposed rates.

The fair value of all the petitioning

was formed to build an electric railway 40 miles long, extending from Trenton by way of Allentown and Lakewood to Point Pleasant.

In 1908 the Court of Chancery named James M. Dickinson receiver for the company and he sold the property to new interests. Mr. Tilford sets up in his bill of complaint that no part of the road has ever been constructed; that in July of 1910 the company executed to the Trenton Trust & Safe Deposit Company as trustee a mortgage to secure \$1,500,000 of gold bonds, of which \$260,000 have been issued; that the company has no income; that judgments have been entered against it, and that it owes Charles R. LeCompte and James H. Butcher \$19,800 for money loaned or advanced by them. He declares that a receiver is necessary for the protection of those interested.

the government for companies to avoid making unnecessary demands upon the investment market, the York Railways did not in 1917 engage in any construction work not absolutely required. The expenditures charged to cost of property for the railway lines were \$39,764.

### FLOATING INDEBTEDNESS KEPT DOWN

During the last fiscal year no securities were sold and no floating indebtedness was incurred. The deferred dividend on the preferred stock, amounting to 2½ per cent, was fully paid up on Jan. 30, 1917. Items aggregating \$44,325 were written off and charged to depreciation. A sum of \$13,656 was realized from the sale of obsolete and worn-out equipment and credited to construction. Real estate amounting to \$1,310 was sold by the company.

## Wants Valuation Discontinued

Declaring that continuance of the work of making a physical valuation of the country's railroad systems, authorized by Congress several years ago, would involve an expenditure of upwards of \$50,000,000 at a time when this money could be used for more vital war purposes, directors of the Philadelphia Bourse have adopted and forwarded to Washington resolutions urging that Congress repeal the law under which the valuation is being made.

A bill providing for the repeal of the physical valuation act has already been introduced and the Bourse makes an earnest plea that it be favorably acted on.

## Financial News Notes

**Wheeling Suburban Line Leased.**—Arrangements are said to have been completed by which the property of the Steubenville, Wellsburg & Weirton Railway, consisting of about 14 miles of line, will be operated under lease by the Wheeling (W. Va.) Traction Company.

**Additional Preferred Stock for Rochester Company.**—The Public Service Commission for the Second District of New York has granted permission to the Rochester Railway & Light Company to issue \$2,000,000 par value of its 7 per cent cumulative preferred stock. The company will use the additional capital in paying off notes taken up for construction work and to reimburse its treasury for sums expended for purposes of capitalization.

**Indiana Road for Sale Under Foreclosure.**—Herbert E. Bucklen, appointed

receiver for the St. Joseph Valley Railway, Elkhart, Ind., in the Superior Court at Elkhart several weeks ago, has been ordered to sell the property and advertised the road to be sold on March 20. It was proposed to offer the road first as a going concern and if it could not be sold that way to sell it in parcels. Should this manner of selling prove unprofitable, the ties, rails and rolling stock will be sold separately and the road junked. The road is 9 miles long.

**Funds Deposited to Meet Pittsburgh Coupons.**—The Pittsburgh (Pa.) Railways has deposited funds with the trustees for the coupons that were in default on the various issues of bonds, except the \$4,804,000 of United Traction Company, Pittsburgh, bonds. The coupons will be paid on presentation. The bondholders' protective committee, of which Thomas S. Gates is chairman, has a suit pending seeking to compel recognition by the Philadelphia company of responsibility for the principal and interest on underlying bonds of companies in the Pittsburgh Railways.

**Object to Abandonment.**—A joint resolution has been adopted by the Common Council of Richmond, Va., and will now go to the Board of Aldermen asking City Attorney Pollard to report as to what steps will be necessary to compel a resumption of service by the Richmond & Chesapeake Bay Railway, or else remove the company's tracks from the streets of Richmond. The suspension of operation by the company was noted in the ELECTRIC RAILWAY JOURNAL of Jan. 12, page 105.

**Debentures Offered by Cities Service.**—Stockholders of the Cities Service Company, New York, N. Y., are given the right to subscribe to \$3,000,000 series "B" 7 per cent convertible gold debentures. They are dated Jan. 1, 1918, and are due Jan. 1, 1966. Coupon debentures, which may be registered as to principal, are in denominations of \$1,000 and \$500. Debentures, registered as to principal and interest, are in

denominations of \$5,000, \$1,000, \$500, \$100, \$10 and multiples of \$10 up to \$100. Interest on coupon debentures is payable semi-annually on Jan. 1 and July 1 in each year. Interest on debentures, registered as to principal and interest, is payable by check at the option of the holder, either annually, semi-annually, quarterly or monthly, except that interest on debentures of less than \$100 principal amount shall be payable on Jan. 1 annually. The only interest bearing obligations of Cities Service Company, other than these series "B" debentures, are \$54,900 series "A" 5 per cent debenture bonds yet remaining unconverted and a note given in purchase of Liberty Bonds.

**Dallas Return 2 Per Cent in January.**—Figures showing the earnings of the Dallas (Tex.) Railway for January, 1918, under the Hobson-Strickland franchise, as compared with those for January, 1917, under the old franchises, have been prepared by M. N. Baker, supervisor of public utilities. The gross earnings for January, 1918, show an increase of \$3,736 over those of the same month in 1917, but a decrease of \$6,234 as compared with December. Railway operating expenses increased materially, the increase being mainly for power purchased, salaries and wages, and expenses in connection with the operation of the Interurban Terminal Building. Operating statistics show that more cars were operated in January, 1918, but that the earnings per car-mile were considerably less. Up to Jan. 31, 1918, a total of \$45,386 had been expended on improvement requisitions by the railway. The balance available for the authorized return for January, 1918, was at the approximate annual rate of 2 per cent of the authorized property valuation. The return was about 4 per cent for the first four months of operation under the new franchise. This period included the time of the Texas State Fair, when business was particularly heavy.

## Electric Railway Monthly Earnings

### CAPE BRETON ELECTRIC COMPANY, SYDNEY, N. S.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$46,120	\$27,356	\$18,764	\$6,535	\$12,229
1 " " '16	40,284	*22,346	17,938	6,552	11,386
12 " " '17	464,081	*298,247	165,834	78,652	87,182
12 " " '16	393,666	*231,265	162,401	78,327	84,074

### COLUMBUS (GA.) ELECTRIC COMPANY

1m., Dec., '17	\$103,820	*\$42,155	\$61,665	\$31,782	\$29,883
1 " " '16	84,382	*30,166	54,217	28,527	25,690
12 " " '17	1,096,066	*420,461	675,605	359,102	316,503
12 " " '16	881,353	*351,233	530,120	343,574	186,546

### GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.

1m., Dec., '17	\$209,590	*\$129,650	\$79,940	\$38,573	\$41,367
1 " " '16	176,496	*109,857	66,639	36,859	29,780
12 " " '17	2,088,121	*1,384,871	703,250	450,880	252,370
12 " " '16	1,944,839	*1,236,107	708,732	438,993	269,739

### HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.

1m., Dec., '17	\$31,192	*\$20,311	\$10,881	\$5,975	\$5,806
1 " " '16	29,777	*15,080	14,697	5,240	9,457
12 " " '17	343,133	*216,152	126,981	61,300	65,681
12 " " '16	326,398	*186,459	139,939	63,916	76,023

### INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.

1m., Jan., '18	\$3,569,021	*\$1,964,320	\$1,604,701	\$1,170,105	\$434,596
1 " " '17	3,630,692	*1,707,049	1,923,643	1,005,214	\$918,429
7 " " '18	23,238,037	*13,059,033	10,179,004	7,652,190	\$2,526,814
7 " " '17	22,653,717	*10,885,528	11,768,189	6,978,987	\$4,789,202

### HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan., '18	\$575,927	*\$291,809	\$284,118	\$217,531	\$66,587
1 " " '17	541,294	*234,332	306,962	216,231	90,731

### NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO

1m., Jan., '18	\$542,301	*\$370,858	\$171,443	\$94,665	\$76,778
1 " " '17	490,380	282,843	207,537	84,008	123,529

### PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

1m., Dec., '17	\$971,130	*\$611,043	\$360,087	\$203,619	\$156,468
1 " " '16	788,880	*443,296	345,584	184,923	160,661
12 " " '17	9,454,861	*5,854,019	3,600,842	2,351,187	1,249,655
12 " " '16	8,107,371	*5,120,995	2,986,376	2,212,982	773,394

### REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO

1m., Dec., '17	\$492,941	*\$359,717	\$133,224	\$92,201	\$41,023
1 " " '16	373,412	*223,729	149,683	81,746	\$67,937
12 " " '17	4,889,915	*3,541,183	1,548,732	1,004,426	\$544,306
12 " " '16	3,987,616	*2,327,407	1,660,209	827,569	\$832,640

### TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.

1m., Jan., '18	\$841,724	*\$662,165	\$179,559	\$160,515	\$19,044
1 " " '17	897,932	612,161	285,771	149,363	136,408

\*Includes taxes. †Includes non-operating income. §Includes accruals under rapid transit contracts with city payable from future earnings.

# Traffic and Transportation

## Lincoln Petition Heard

Nebraska Commission, Having Decided Against Emergency Rates, Proceeds with Permanent Appeal

The State Railway Commission of Nebraska on March 4 opened the hearing on the application of the Lincoln (Neb.) Traction Company for a permanent increase in the rates of fare. The commission had previously denied an amended appeal for emergency increase. This was noted in the *ELECTRIC RAILWAY JOURNAL* for March 2, page 435.

### RATE AND CAPITALIZATION CASES COMBINED

As a first move the commission decided to consolidate the rate case with the application to issue \$281,000 of new preferred stock. This the commission did over the objection of the company. W. E. Sharp, president of the company, took the position that inasmuch as the company was entitled to earn a specific per cent, 7 per cent or some other rate, on the actual investment the amount of stocks or bonds was immaterial, as the distribution of what was left after operating expenses were met was a matter for the company to determine under the supervision of the commission.

The commission had issued orders that certain improvements should be made, and the money of the company was used in making them. It was now asking that it be authorized to sell securities to replace the money. Mr. Sharp had always insisted that rates should be large enough to permit the company to meet all its charges and also build up a surplus to take care of the refinancing and abnormal conditions.

O. J. Shaw, secretary of the company, testified with regard to the details of operation of the company. He said that if the company carried the same number of passengers in 1918 that it did in 1917 it would require an average revenue from each of 6.51 cents to give a return of 1 per cent on the investment. The interests of the company require that the rate of fare shall not be so high that it will drive traffic away from the railway.

### SUGGESTIONS FOR CUTTING EXPENSES

Mr. Shaw said there were several ways in which the expenses could be curtailed. One way was to get rid of duplications, reduce unnecessary service and by consolidating lines. Instead of making a flat rate of fare with free transfers, he proposed several alternatives. One was to make a basic rate of fare, with additional charges for zones. Another was to charge for transfers. Attention was also called to the fact that the selling of school

tickets at ten tickets for a quarter was just about half the cost of carrying the holders, and that it was impossible to prevent the abuse of the school tickets and the fraudulent use of transfers by passengers, owing to the location of the lines.

### VALUE PLACED AT \$3,300,000

Mr. Shaw figured the total actual value and investment in the railway, the light and power, and the heating department as in excess of \$3,300,000. In arriving at these figures he took the basic valuation as determined by the commission in 1909, when the consolidation took place, which was \$1,992,000, and to this added all additions and betterments and made the necessary deductions. He found values as follows: railroad plant, \$2,861,724; of the light and power plant, \$341,163, and of the heating plant, \$131,431.

## Oregon Commission Upheld

Circuit Court Upholds Right of Commission to Fix Rates—Necessity or Reasonableness Not Considered

The 6-cent fare ruling of the Public Service Commission of Oregon in the case of the Portland Railway, Light & Power Company was upheld by a unanimous opinion handed down on March 14, by the six circuit judges of Multnomah County sitting en banc.

The opinion states that the "expediency, necessity or reasonableness" of the 6-cent fare was not considered, but that the opinion was based solely on the points of law involved in the question of whether the commission has the power to regulate the rates of any public utility. The opinion covers all the arguments advanced both for and against the 6-cent fare during the hearing.

The city will appeal the case to the State Supreme Court.

### DECISION A VICTORY FOR COMPANY

The decision is regarded as a signal victory for the company as the collection of 6-cent fares can continue. This would not have been the case if the opinion had been unfavorable.

The decision of the commission in the case was reviewed at length in the *ELECTRIC RAILWAY JOURNAL* of Jan. 26, page 184. The hearing on the appeal of the city to the courts from the decision was begun on Feb. 26 and the testimony was reviewed in the issues of this paper for March 9, page 479, and March 16, page 543. In addressing the court Assistant Attorney General Bailey, who represented the commission, said that the only question before the court in the case was whether or not the court had the jurisdiction to change the rates.

## Franchise Relief Refused

Washington Body Dismisses Service Complaint, But Otherwise Is Uncertain of Its Authority

The Public Service Commission of the State of Washington, in a recent decision in Tacoma, dismissed the complaint of certain Tacoma residents against the Tacoma Railway & Power Company, filed for the purpose of compelling the company to improve service given on Center Street. The majority of the commission took the view that the commission was without power to grant the railway authority to increase its fares beyond the 5-cent limit fixed by the State law.

### COMMISSIONERS NOT FULLY AGREED

Each member of the commission wrote an opinion in the case. Commissioners A. A. Lewis and Frank R. Spinning both expressed the belief that the maximum 5-cent fare, fixed by the State law, could not be exceeded. Chairman E. F. Blaine, however, took an entirely opposite view, holding that it was the province and duty of the commission to say what was a reasonable and fair rate, irrespective of the 5-cent maximum given in the State law. The commissioners, however, in view of the varied opinions of its members, expressed the hope that the matter will be taken to the Supreme Court, and a precedent established on which they may base future decisions.

Corporation Counsel Caldwell of Seattle has been instructed by the City Council to appear in the case, as a friend of the court, in the event an appeal is taken. Counsel Caldwell, in calling the matter to the attention of the court, pointed out that, from the decision in the Tacoma case, it would seem likely that any attempt of the Puget Sound Traction, Light & Power Company, Seattle, to obtain an order increasing its fares, would meet the unfavorable action of the commission, unless one course is to be followed in Tacoma and another in Seattle.

### CASE CARRIED TO COURT

Immediately following the decision of the commission, Louis H. Bean, manager of the Tacoma Railway & Power Company, secured a writ from Chief Justice Ellis, directing the Public Service Commission to either grant the Tacoma company such relief at once, or show cause before the Supreme Court on March 15 why it should not be done. The petition recites that while the commission, in the recent Tacoma Avenue decision, denied the company's prayer for increased fare and relief from franchise obligation, it also found that the company could not render safe, adequate and sufficient service without such relief. In seeking a writ, the company contends "that great and irreparable injury will be done the city of Tacoma, Pierce County, and the United States if the commission's policy as announced by the majority opinion is carried out, because of existing war demands for adequate transportation."

## Connecticut Fare Brief Filed

### Answer of Company in Rate Case Says City Has Failed to Prove Six-Cent Fare Unreasonable

In concluding its brief filed with the Public Service Commission of Connecticut in the case involving the appeal of the city of Hartford for the restoration of the 5-cent fare in that city, the Connecticut Company made the following statement of remedies suggested for the relief of the present financial condition of the company:

"In addition to a finding by the commission that at the present time the 6-cent fare upon all its lines is not unreasonable and excessive, we still feel that there are other remedies which should be granted to the company, although most, if not all, of these remedies lie rather in the power of the Legislature than in the power of the Public Utilities Commission.

#### REMEDIES SUGGESTED

"1. The company should be allowed to earn a sufficient amount to pay its operating expenses, taxes, fixed charges, maintenance and depreciation, and a fair return upon the value of the property devoted exclusively to the public use, irrespective of how this revenue shall be secured.

"2. The industry is such an important part of the community life that any further legislation should look toward permanent means of keeping the property in a safe and convenient operating condition, and to secure to the company the opportunity of raising either public or private funds in such a way that the development of the property may be constant, both with respect to the extension of lines and enlargement of facilities on existing lines.

"3. There should be no change or alteration in the law which permits the directors of the Connecticut Company to manage the properties as they have been accustomed to do in the past, but they should still be subject to inspection and supervision by the Public Utilities Commission. Especially should no change be made in the fare regulatory powers of the commission.

"4. The company should be relieved of the burdens placed upon it by statute, providing for the construction and maintenance of pavements between its tracks, and the company should not be subject to the construction programs of municipalities which vary from year to year, and which compel the expenditure of money out of capital or earnings, the expenditure of which funds is entirely non-productive to the car rider.

"5. The company should be given relief from the excessive burden due to ornamental bridge construction, which falls within the same class as the burden with respect to new pavement and pavement repairs.

"6. There should be passed legislation with respect to the competition of jitneys, so that if this form of transportation is to exist it may be taxed by the State and regulated by the commission, so that the competition be-

tween the two forms of transportation should be upon a fair basis.

"7. The only manner in which first class electric railway service can be assured to the car rider, regardless of whether public or private capital is employed, is for the rate of fare to be sufficient to pay a proper rate of interest, and if public funds are to be employed, any deficit in operating expenses must be made up from taxes upon the community served.

"The solution suggested by Mr. Brush is the service-at-cost scheme, which has been tried in Cleveland, Dallas and Kansas City. This plan involves a graduated scale of fares to go up and down automatically as the rehabilitation fund is increased or depleted. It is similar to the Cleveland scheme, with the exception that it avoids the criticism of the latter in that it has no maximum rate of fare. Such a scheme avoids any hearing upon what rate of fare shall be charged. As this scheme is in an embryonic state, it will not do in this brief to go into the subject, but for a final solution of the street railway difficulties some such method undoubtedly must be adopted eventually."

#### THE CITY'S POINTS ANSWERED

In conclusion, the company answered the points of counsel for the city at the end of his brief, by stating:

"1. That Hartford has no right to be considered separate and apart from all the other properties of the Connecticut Company for the purpose of determining whether or not the 6-cent fare in Hartford is reasonable for the reasons hereinbefore stated. That the company is not delinquent in keeping its books, as they are kept in accordance with the Interstate Commerce Commission system of accounting, and in the form prescribed by the Public Service Commission of Connecticut, and that it has been justified in keeping them in this manner, though the method employed does not meet with the approbation of the city of Hartford.

"2. That no rearrangement of the fare zones should be made at the present time, or made at any time, without the most careful study into both social and economic conditions.

"3. That the proof shows very clearly that, owing to the large increase in operating expenses of the company, the 6-cent fare is not unreasonable or unjust to the short rider than was the former 5-cent fare.

"4. That the city has failed to maintain its burden of proof that the 6-cent fare is an unreasonable and excessive rate of fare or charge in the city of Hartford, and from Hartford to adjoining towns, and that the petition of the city of Hartford should be dismissed."

The brief of the city was reviewed in the *ELECTRIC RAILWAY JOURNAL* for Feb. 16, page 339. The city did not

concede that in so far as Hartford was concerned the company needed additional revenue, but it argued that if this were the case then there should be a rearrangement of the fare zones, with a central 5-cent fare zone as a base.

## Relief for Jersey Interurban

### Company Authorized to Increase Fare from Five Cents to Six Cents in Each of Seven Zones

The Northampton, Easton & Washington Traction Company, Easton, Pa., was authorized by the Board of Public Utility Commissioners of New Jersey on March 11 to increase the rate of fare from 5 cents to 6 cents in each of the seven fare zones from Phillipsburg to Port Murray, N. J., a distance of 17 miles. This is in accordance with the application made previously to the commission, but denied by that body in July, 1917, because of court rulings, which have since been more liberally construed.

#### PETER ROBBED TO PAY PAUL

At the previous hearing it was shown that there was a deficit of \$7,150 for the year 1915; and a deficit of \$5,311 for the year 1916. The additional proofs offered when the appeal to the commission was renewed showed a deficit of \$7,131 for 1917, and a comparative deficit for January and February, 1918, of an increased amount. The proofs also showed that conditions were growing worse instead of better. Not one dollar had been set aside for depreciation in any of the years mentioned. The net operating return had been and continued to be insufficient to meet interest on the bonded debt, but the interest on the bonded debt of the company had been paid, any deficit in the sum of money required for the payment of interest having been loaned by the Northampton, Easton & Washington Traction Company of Pennsylvania to the New Jersey Company.

The New Jersey board in its previous report dated July 16, 1917, recognized the serious financial condition of the company, but felt constrained to deny it relief because of its interpretation of the decision of the New Jersey Supreme Court in the case of the Atlantic Coast Electric Railroad vs. the Public Service Commissioners, 89 N. J. Law, page 407.

The petitioner caused the findings of the Board of Public Utility Commissioners in its proceedings to be reviewed by the Supreme Court, and the decision filed during the present February term holds that it is the duty of the Board of Public Utility Commissioners to approve the establishment of a just and reasonable rate, when it appears that the existing rate is insufficient regardless of limitations contained in municipal ordinances respecting rates of fare.

The order in question was therefore set aside and the Northampton, Easton & Washington Traction Company renewed its application before the New Jersey Board for the increased fares.



## Suburban Seeks Increase

Trenton-Princeton Road Wants to Boost Fare Unit from Five Cents to Six Cents

The New Jersey & Pennsylvania Traction Company on March 16 asked the Board of Public Utility Commissioners of New Jersey to sanction an increase of 4 cents in the fare between Trenton and Princeton. The company would also have the board rescind the order requiring it to sell blocks of twelve tickets for \$1. The commissioners set April 12 for a hearing on the request.

### FARE INCREASE FROM TWENTY TO TWENTY-FOUR CENTS

The Princeton branch is at present divided into four 5-cent zones. The company is asking the commission to allow it to demand 6 cents for each zone, making the fare 24 cents one way. The block tickets were ordered continued by the Utility Board when the fare was made 20 cents in 1916. They are good for travel from Lawrenceville to Trenton or Princeton. The traction company maintains that the use of the tickets is being abused for continuous rides between Trenton and Princeton. The company contends that to eliminate the tickets and make the fare 6 cents for each zone would increase the revenues "sufficiently to overcome, in part at least, the advanced operating expenses now being incurred."

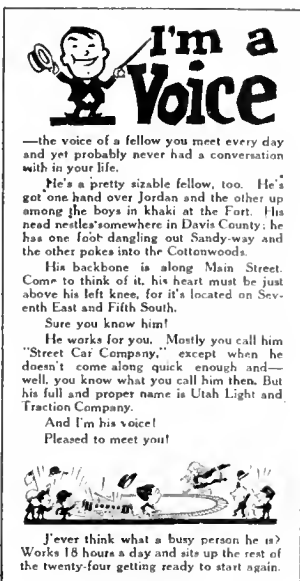
Frank S. Katzenbach, counsel for the company, sets forth that its net earnings for 1916 were \$19,417, but that they dropped last year to \$13,328 because of the increased cost of labor and materials. Gross earnings for 1917, however, increased \$4,004 over 1916.

### FARE ONCE TEN CENTS

The road was in the hands of a receiver in 1913, when the fare to Princeton was 10 cents. The Utility Board ruled that the income was insufficient and Princeton and Princeton Township revoked their ordinances which prohibited any increase. The Utility Board fixed the rate at 15 cents, but on two years' trial ruled that the sum was still too low and then 20 cents was decided upon. The board declared in 1913 that a net profit of \$30,000 was warranted by the value of the property.

## Opposition Organizes

At a conference of the executive committee of the New Jersey State League of Municipalities on March 14 after the postponement of the hearing before the State Board of Public Utility Commissioners on the application of the Public Service Railway for an increase in fares, it was agreed to ask the cities effected to contribute an assessment of 2 cents per capita to raise a fund of between \$25,000 and \$35,000 to fight the proposed increase. George N. Seger, Mayor of Passaic, president of the league, was authorized to engage ex-Congressman Marshall Van Winkle of Jersey City as chief counsel for the league in the matter.



**I'm a Voice**

—the voice of a fellow you meet every day and yet probably never had a conversation with in your life.

He's a pretty sizable fellow, too. He's got one hand over Jordan and the other up among the boys in khaki at the Fort. His head nestles somewhere in Davis County; he has one foot dangling out Sandy-way and the other pokes into the Cottonwoods.

His backbone is along Main Street. Come to think of it, his heart must be just above his left knee, for it's located on Seventh East and Fifth South.

Sure you know him!

He works for you. Mostly you call him "Street Car Company," except when he doesn't come along quick enough and—well, you know what you call him then. But his full and proper name is Utah Light and Traction Company.

And I'm his voice!

Pleased to meet you!

Never think what a busy person he is! Works 18 hours a day and sits up the rest of the twenty-four getting ready to start again.

## Enters—Another Baby!

The Utah Light & Traction Company, Salt Lake City, Utah, has begun the publication of a four-page weekly, in which it will carry the message of the company to its patrons. The first issue was dated March 2. The paper has not yet been named. The company is leaving that for its patrons to do, subject, of course, to certain limitations. This process will be turned into a competition best told by the paper itself, as follows:

"Jimminy!

"Oh, my, this is awful!

"They've sent me out all dolled up and haven't given me a monacher—something for folks to call me by when they want me.

"I feel all fussed—just like I'd run off without a necktie—or worse!

"I've simply got to have a name, even if I have to pay to get one. I figure my folks will stand for at least \$25 to get me christened.

"So I make you this proposition—

"If you'll find me a name, one that has a lot of pep to it, and that will give folks a good idea of just who, what and why I am, I'll see that a check for \$15 goes to the man, woman or child whose name for me is selected by a committee as the best one sent in. For you who are good scouts enough to try, and come close, I'll make \$5, a second prize, \$3, a third prize and \$2 a fourth prize.

"Remember my mission in life—to start the liveliest kind of a conversation on the transportation likes and dislikes, needs and wants of the Salt Lake public and their neighbors and visitors. Put all that in your name, spice it up with a snappy sound, and you'll get those prize simoleons."

The first page of the first issue of the new paper is shown above.

## Refer the Doubters to Us

"If you don't believe the situation in the electric railway industry is serious, yes, menacing, read the **ELECTRIC RAILWAY JOURNAL** of Jan. 5, 1918."—*Watts Watt* of the Portland Railway, Light & Power Company, Portland, Ore.

## President McMeen's Story

He Acquaints the Public of Columbus, Ohio, with the Necessity for Increased Fare

In a public statement made on March 13, Samuel G. McMeen, president of the Columbus Railway, Power & Light Company, Columbus, Ohio, said in part:

"We have been telling facts about the cost of railway service and the reason why an increased fare is necessary. We shall continue to do so from day to day. There still remain many facts to be told and many conclusions to be drawn.

### ASKING HIGHER FARES DISTASTEFUL

"We do not like to ask for higher fares. But as we are subject to the same trying conditions as others, we must meet them with such action as they require.

"In our discussion of the problem with you and your representatives we mean to be frank, sincere and patient. After all, the task is one calling for a rational meeting of minds, and we feel that some progress has been made. We do not doubt the ultimate fairness of the people of Columbus."

### CITY AND COMPANY INTER-DEPENDENT

In one of its advertisements the company calls attention of the inter-dependence of the city and the street railway. The advertisement states that this mutual necessity imposes an obligation upon both. Because the company needs the city and the city needs the railway, it is necessary to take into consideration the means of keeping the road in the best operating condition and at the same time place no undue burden upon the public.

In another advertisement the company defines the ride, instead of the trip, as the unit of measure in electric railway service. The ride consists of three elements, boarding the car, remaining on the car after it has started, and alighting from the car. A trip, if it consists only of a ride, has but the three elements, but if it consists of two rides it has six elements, and if three rides are necessary then there are nine elements.

Whether the passenger proffers for his ride 5 cents, 3½ cents or a transfer, the company is compelled to furnish the ride. Hence the ride is the unit of service and for this the company is receiving an average of only 2.6 cents per passenger.

### BRINGING APPRAISAL UP TO DATE

According to an estimate furnished the City Council by G. Herman Gamper, the cost of making an appraisal of the present unvalued property of the company would be between \$5,000 and \$6,000. The Public Utilities Commission's appraisal furnishes the figures for about two-thirds of the property. A committee of Council had been instructed to make an investigation of the cost with the idea of securing data for conducting intelligent negotiations with the company in the future.



## City Heard

### City Engineer of St. Louis Regards Present Fare Adequate if Franchise Relief Is Granted

C. E. Smith, city engineer of St. Louis, Mo., testified on March 14 before the Missouri Public Service Commission on the United Railways' petition for increased revenues. Mr. Smith said that in his opinion the company would receive a fair return under the present 5-cent passenger fare if it were relieved of the mill tax, other city taxes were reduced, and a franchise extension granted. He added that the company would have to effect certain additional operating economies. Mr. Smith also stated he believed a 5-cent-an-hour increase for carmen was fair, instead of the 10-cent-an-hour increase the men demand.

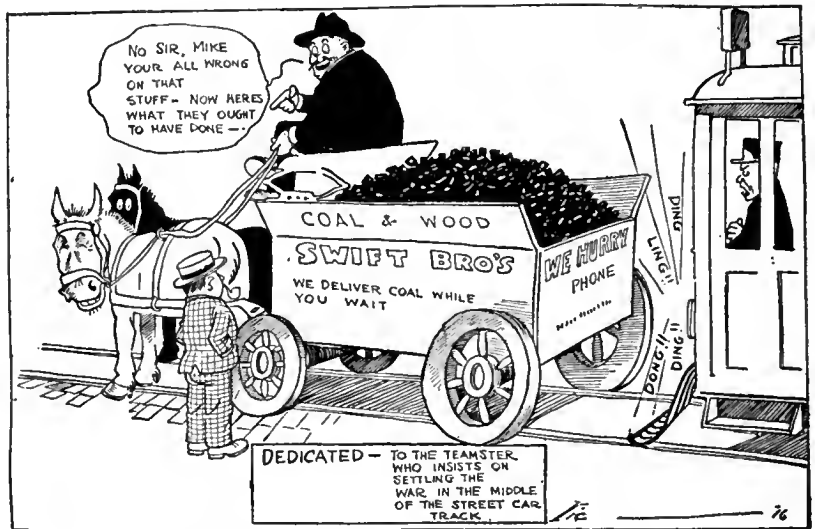
Mr. Smith said that when the United Railways sought a settlement of the mill tax and a thirty-one-year extension of its franchises last year the company's books were opened to him. The company's first financial difficulties came in 1910, when notes for \$1,405,000 fell due. The city announced it would fight to collect the mill tax, then about \$1,500,000, and also showed it was not disposed to grant an extension of the Jefferson Avenue franchise, which expired in 1911. This franchise has not been renewed. These matters coming at the same time prevented the company from getting new capital, and it had not since been able to obtain the capital. The net earnings of the company from 1910 to and inclusive of 1917 were \$31,558,000, or an average of \$4,294,775 a year, a sum equal to 10 per cent of the market value of the company's securities, or 4 per cent of the capital value during that period. The net earnings were spent in improvements. Had the earnings gone into dividends the company soon would have faced receivership.

#### PRESIDENT McCULLOCH CROSS-EXAMINED

The session of the commission of March 13 was given over almost entirely to the testimony of Richard McCulloch, president of the company. He was cross-examined by City Counselor Daues. He testified that he considered the Keokuk dam and the Union Electric Light & Power Company power contracts among the most valuable assets of the United Railways.

Mr. Smith also referred to the pending franchise settlement with the company. He reviewed briefly the terms of the tentative grant and expressed the opinion that the passage of the ordinance would go a long way toward stabilizing the position of the company.

It was decided by the commission to continue the hearings on March 25. James E. Allison, former chief engineer of the City Public Service Commission, who is engaged in revising the valuation of the United Railways property made by him in 1911, will be the next witness for the city in the hearing of the company's application.



"ELECTROGRAM" ILLUSTRATES THE TEAMSTER NUISANCE

## Seattle Cases Go Over

### Ticket and Gross Earnings Litigation Will Come Up Before State Supreme Court in May

Argument of the 4-cent ticket case, and the 2 per cent gross earnings case, in both of which the Puget Sound Traction, Light & Power Company and the city of Seattle, Wash., are the principal litigants, which was set for March 13, has been postponed until the opening date of en banc hearings at the May term of the Supreme Court. The Supreme Court recently advised Hugh M. Caldwell, corporation counsel of Seattle, to this effect, taking the view that the cases are of such importance that the entire bench should have opportunity to pass on them.

The 4-cent ticket case went to the Supreme Court on appeal taken by the city of Seattle from a decision of Superior Court Judge J. R. Mitchell, at Olympia, in affirming the order of the Public Service Commission eliminating the 4-cent tickets without advising the city of any pending petition with that end in view.

The 2 per cent gross earnings case reached the court on an appeal taken by the company from Judge Ronald's decision in awarding the city a judgment against the company for about \$62,000, representing unpaid gross earnings tax for 1916. The company has made an appeal to the Public Service Commission to be relieved of certain of its franchise obligations, including 2 per cent of the gross earnings annually, and, while willing to pay the amount under protest, refused to do so unless the city dismissed litigation for the enforcement of the obligations, pending an order by the commission.

## Safety Campaign Helpful

The safety campaign of the Toledo Railways & Light Company, Toledo, Ohio, under the management of Raymond T. Metzger, is bearing fruit. Accidents through February of this year, both on the streets and in the shops, show a decided decrease over those of

the same month in 1917. In all there were 296 accidents during the past month, while the number was 389 for February a year ago.

Of these 114 were automobile accidents and fifty were to horse-drawn vehicles. Last year there were fifty-six accidents to persons boarding and alighting from cars. The number this year was reduced to twenty-seven. Mr. Metzger attributes this reduction partly to the use of pay-as-you-enter cars, but the additional safety devices provided and the campaign of education among the employees have had much effect.

Accidents to shop employees numbered twenty-one this year, compared with fifty-two during February, 1917.

Large calendars, bearing safety illustrations, have been placed in every school room in the city, and the company invites persons who have the care of any number of children to call for these calendars and place them where they can be seen.

## Slow Progress in New York Fare Cases

At the hearing on March 14 before Governor Whitman, in regard to a bill to authorize a 6-cent fare throughout New York, Joseph K. Choate, chairman of the committee of ten of the New York Electric Railway Association, described in detail the critical condition of electric railways in the State. In the course of his remarks Mr. Choate said that petitions for increased fares had been filed ten months ago with the First and Second District Commissions, but that no hearings in the First District had been brought to a conclusion and only six or eight cases had been finished in Albany. This delay, he said, had been almost unavoidable in complying with the law and the requirement of the commissions that the right to increase rates can be authorized only on the basis of a "fair return upon a fair valuation." This requirement has been complied with or is being complied with at the present time, but it has of necessity required a long time to prepare and hear the cases.

## Rhode Island Recommendations Defended

### Legislative Committee Examines Members of Special Commission Which Recommended Zone Fares

The question of financial relief for the Rhode Island Company, Providence, R. I., is being considered by a special legislative committee created for the purpose of reviewing the report presented by the commission which has been studying the matter for the past year and which recently recommended the establishment of a modified zone system and other changes estimated to increase the revenue of the company \$890,000 a year.

In the meantime, under acts passed by the Legislature and signed by the Governor, the establishment of the zone system is held up, and the Public Utilities Commission has been ordered not to authorize or allow any change to be made in the present fare system or rates until further authorization from the Legislature.

The first act of the legislative committee was to give a hearing to the officials of the company. Mr. Jennings of the committee ascertained from C. A. Babcock, comptroller of the company, that since 1908 the company has borrowed \$3,500,000 from the New Haven Railroad and an additional \$1,662,000 through the Industrial Trust Company, Providence. Mr. Jennings asked the company's officials if it was considered good financing to borrow money and at the same time pay dividends. They suggested that this was a question to be referred to the trustees, who were not present.

#### ZONE SYSTEM DESIRABLE

The second day of the hearings was taken up with a presentation of the case by Chairman Zenas W. Bliss of the special commission which recommended the zone system, and William C. Bliss, also of that board and chairman of the Public Utilities Commission. Both of these men defended the report and declared that the establishment of the zone system as recommended was desirable and for the best interests of all concerned. Zenas W. Bliss declared that State ownership was not, to his mind, a good solution of the electric railway problem in Rhode Island. He declared that the State could not operate the lines with a 5-cent fare, even if they were taken over. Mr. Bliss explained the details of the zone system and declared that it was a just and equitable arrangement.

William C. Bliss stated that in the act creating the commission that body was directed to make a report and show a "just and equitable" system of fares. He showed that under the present system some lines carry a passenger 9 miles for 5 cents where other lines take a passenger only 2 miles for 5 cents. He declared that such unjust conditions as those should not be continued and certainly could not be made a part of a just and equitable fare system. The commission therefore eliminated them and made the zones as

near equal in length as reasonable under existing conditions. He said: "Naturally those persons who have been able to get a long ride for little money would be compelled under the zone system to pay a greater increase than those who in the past had been paying for all they got in the form of a ride."

Zenas W. Bliss said that absolute State control of the road, with a guaranteed return to the owners, was the best solution.

Officials of the city of Providence appeared at the third hearing. The fourth hearing was devoted to listening to the opinions of members of the General Assembly. The committee is directed to make a report on or before March 26 to the Assembly.

### I. T. S. Rate Case Closed

With the hearing of oral arguments at Springfield, Ill., on March 20, on the petition of fourteen local utilities included in the Illinois Traction System, Peoria, for emergency increases in rates the case was closed and the Public Service Commission took the matter under advisement. Arguments opposing the proposed increases were presented by representatives of Bloomington, Champaign, Decatur and other cities, while in some of the cases the opposition was withdrawn. The Council of Clinton has already accepted the rates. Quincy, Jacksonville and Ottawa were not represented for argument. Counsel for the city of Bloomington questioned the authority of the commission to change the franchise rates. H. I. Green, counsel for the company, cited the case of the Chicago & West Towns Railroad as a precedent. The ruling of the commission on the application of this company was referred to in the *ELECTRIC RAILWAY JOURNAL* for Feb. 9, page 295. Mr. Green closed for the company.

## Transportation News Notes

**One-Man Cars for Houston.**—The Houston (Tex.) Electric Company expects to receive eighteen one-man cars during April.

**Skip-Stop Trial in Des Moines.**—The skip-stop plan will be tried in Des Moines for a month, starting on April 1 on the University line.

**Interurban Uses Skip Stop.**—The Indianapolis & Louisville Traction Company is adopting the skip-stop plan to an extent in the local interurban service between Louisville, Ky., and Indianapolis, Ind.

**Fare Appeal in Jackson.**—The Michigan United Railways, through J. F. Collins, vice-president and general manager, has appealed to the City Commission of Jackson for permission to put a 6-cent fare into effect in that city.

**Augusta-Aiken Fares Increased.**—Passenger fares on the Augusta-Aiken Railway & Electric Company's lines from Augusta to Aiken, S. C., through the Horse Creek Valley, were increased on March 1, from 25 cents to 40 cents, with the approval of the Railroad Commission of South Carolina.

**Twenty per Cent Freight Increase Allowed.**—The Public Service Commission of New Hampshire has granted the Claremont Railway & Lighting Company a 20 per cent increase in freight rates, to take effect immediately, pending a further investigation of the proposed increase, placed with the commission some months ago.

**Road Wants Mileage Fares.**—The Missouri & Kansas Interurban Railway, the so-called Strang line, which operates between Kansas City, Mo., and Olathe, Kan., has applied to the Public Utilities Commission of Kansas for permission to establish a passenger rate of 3 cents a mile between all points in Kansas. At present the road is divided in zones.

**New Hampshire Company Seeks Increase.**—The Keene (N. H.) Electric Railway, operating between West Keene and Marlboro, also between West Keene and Spragueville, has petitioned the Public Service Commission for a new schedule of fares. At present the single fares are 6 cents, and the company desires that the single fare be raised to 7 cents. Books containing seven-trip tickets and 100 rides will be sold for slightly less than the single fare.

**Stops Eliminated in Reading.**—In line with the efforts of the police department more effectively to regulate traffic and complying with the government's advocacy of fewer car stops to conserve power, the Reading Transit & Light Company, Reading, Pa., recently agreed to discontinue a number of half square car stops, especially where lines intersect Court and Cherry Streets. These continued to be stopping places after half square stops were generally abandoned several years ago. The new order went into effect on March 17.

**Meralco Hit by Coin Shortage.**—Because of the emergency arising out of the shortage of copper coins and 5 centavo pieces, the Manila Electric Railroad & Light Company, Manila, P. I., has been forced to resort to the use of "1 centavo fare coupons" as small change on the cars. Each conductor received a book containing 100 of the coupons, which are of the same size as car tickets now in general use. Ten of the coupons are accepted for one second-class fare, and twelve of them for one first-class fare. They are also accepted toward the purchase of car tickets and in the payment of electric light bills.

**Another Company Feels the War Burdens.**—J. A. Cleveland, vice-president and general manager of the Saginaw-Bay City Railway, Saginaw, Mich., has issued a statement to the press of the cities in which the company operates reviewing the conditions of increasing costs that confront the utilities. Mr. Cleveland said that "conditions have reached a point where it is now spelling disaster to the public utilities of the country and the inevitable result will be that these companies will cease to be able to furnish proper and adequate service to the public depending upon them unless some relief is obtained and this relief obtained immediately."

**Owl Service Considered for Dallas.**—Owl car service on all the principal lines of the Dallas (Tex.) Railway is being considered by Richard Meriwether, general superintendent, on petitions from a number of residents of the city. The matter has also been referred to M. N. Baker, supervisor of public utilities, who is investigating to determine the amount of patronage such service could expect. Messrs. Meriwether and Baker have addressed inquiries to the persons who signed the petitions, asking on what lines cars should be operated and how often. If it is shown that the service is really desired, Mr. Meriwether declares that it will be started.

**Fare Charge Upheld.**—The borough of Catasauqua complained that the cash fare of 10 cents charged by the Lehigh Valley Transit Company, Allentown, Pa., for single trips between Allentown and Catasauqua was discriminatory and excessive, and that the practice of selling round-trip tickets between these points only at the offices of the company was unreasonable. After a hearing, the Public Service Commission of Pennsylvania decided that the fare of 10 cents for a single trip was neither excessive nor discriminatory, but that the company should place the sale of round-trip tickets in the hands of the conductors on all cars operating between Catasauqua and Allentown.

**Steam Road Protests Electric Interchange.**—The Lake Erie & Western Railroad (steam) has filed a suit against the Public Service Commission of Indiana seeking to have set aside an order of the commission requiring that company to receive freight in carload lots from the Chicago, Lake Shore & South Bend Railway (electric). The Lake Erie & Western Railroad contends that the electric railway does not have the terminal facilities, trackage or equipment that would compare with its own and that it is being forced to make business for the electric railway company under the order of the commission. The steam railroad further contends that all of the towns reached by the interurban railway are now connected by steam railroad.

**Chicago Revival Makes Traffic Problem.**—With about 50,000 people in attendance on Sunday, March 10, the first day of the Billy Sunday campaign in

Chicago, which is to be conducted there during the coming six weeks, the revival promises to create an unusual traffic problem for the Chicago Surface Lines. The Sunday tabernacle is located on Chicago Avenue, near the Lake Shore Drive. It is served mainly by the Chicago Avenue line, with the Grand Avenue line about five blocks away. It is quite distant from the nearest elevated line. To facilitate handling the large crowds the Surface Lines have put in a new cross-over with a stub track which holds twenty-five cars. The Chicago Motor Bus Company is running extra buses, also, to take care of the people.

**Complaint Hearings in Pennsylvania.**—The Public Service Commission of Pennsylvania, during the week ended March 16, heard electric railway cases in which conditions in Philadelphia, Pittsburgh and Harrisburg were considered. The commission also discussed in executive session the question of jurisdiction in complaints against increases of fare where a 5-cent rate is specified in a franchise ordinance. Complaints of the city of Philadelphia, associations and individuals of that city against the Philadelphia Rapid Transit Company were heard on March 14 in Philadelphia; city of McKeesport against the Pittsburgh Railways in Harrisburg on March 11, and George A. Herring against Harrisburg Railways in Harrisburg on March 13.

**Service Hearing in Trenton on April 30.**—The Board of Public Utility Commissioners of New Jersey, at the close of the recent hearing on the application of the city of Trenton for improved electric railway service adjourned the matter until April 30 in order to give ample time for the board to conduct an independent investigation by its own inspectors of the service of the Trenton & Mercer County Traction Corporation, its alleged defects and suggested remedies. Peter Witt, Cleveland, testified as to how the company could increase its revenues and at the same time reduce expenses. Rankin Johnson, president of the company, said one of the greatest sources of trouble was the narrow streets. Mr. Witt suggested the installation of fare boxes. He estimated that the use of the boxes would increase the gross revenue materially.

**Transfer Interchange Action Likely.**—It is regarded as more than likely that the city of Los Angeles, Cal., will attempt to compel the interchange of transfers between the Los Angeles Railway and the Pacific Electric Railway. City Attorney Albert Lee Stephens has announced that in his opinion this is a matter affecting rates, and as the State Railroad Commission has jurisdiction over rates, he would ask the City Council to bring an action before the commission. Following the announcement of Mr. Stephens, Councilman O. P. Conaway, chairman of the public utilities committee of the Council, stated that he would advise action by the Council. Prior to 1915 when the rate-fixing power passed into the hands

of the State Railroad Commission, the courts held against the city in a suit known as the Ninth Street case, brought for a similar purpose.

**864,400 Miles One Man's Record.**—The local paper at Stroudsburg, Pa., said recently: "'Bill' Starner, the well-known motorman on the Stroudsburg Passenger Railway, has the proud distinction of being the most traveled man in this part of the world. 'Bill' has traveled over the billowy main—snow banks and all—with wonderful regularity, for a period of nigh thirty years. It may not be known that 'Bill' travels 100 miles a day, but he does this nevertheless and smilingly acknowledges that most of the trip is taken on a 'moving sidewalk,' i. e., a trolley car. It is interesting to note from 'Bill's' log that, as said before, he has been a-going nearly thirty years and has been feeling just right because his circulation has always been well taken care of from early morning until 'early' at night." The paper estimates that Mr. Starner has traveled 864,400 miles.

**Changes in Downtown Pittsburgh Traffic.**—The engineering conference committee, consisting of representatives of the city of Pittsburgh, the Pittsburgh Railways and the Public Service Commission of Pennsylvania, after investigating various matters connected with the railway situation in Pittsburgh, made certain recommendations for improvements, and the commission after considering the matter as thus presented issued orders to the railway and recommendations to the municipal authorities designed to carry out the determinations of the committee. These recommendations and orders relate principally to the routing of cars, the changing of stops and the bettering of traffic conditions by various measures which tend to relieve the congestion in the downtown district. They are of interest principally to residents of Pittsburgh or to those familiar with the topography of that city. The case is reviewed in Complaint Docket No. 1571 of the commission.

**Diversion of Cars Not Upheld.**—The Supreme Court of the State of Washington recently dismissed the order of the Public Service Commission which required the Puget Sound Traction, Light & Power Company to divert the Twenty-third Avenue car line through the downtown section of Seattle during the heavy traffic hours of morning and evening. The case has been in litigation for two years. The Supreme Court held that the through service order granted by the commission in 1915 and later upheld by the Superior Court of Thurston County was unreasonable and that some inconvenience must be expected in reaching the city by residents of the outlying district. The company contended that its yearly operating expenses would be increased \$19,000 by routing its cars through the city. The decision states that in satisfying the public need a carrier is not also bound to satisfy a public convenience at any considerable loss to itself, when the service is already adequate.

## Personal Mention

**J. W. Wood** has recently been appointed claim agent of the Savannah (Ga.) Electric Company to succeed **J. J. Garity**.

**R. Frank Jones** has recently been appointed secretary of the Macon Railway & Light Company, Macon, Ga., to succeed **E. W. Cabaniss**.

**T. L. Small** has recently been appointed assistant treasurer of the Savannah (Ga.) Electric Company to succeed **L. E. Drew**.

**T. C. Nielson** has been appointed claim agent of the Alton, Granite & St. Louis Traction Company, Alton, Ill., to succeed **C. H. Bartels**.

**Floyd L. Brewster** has been appointed master mechanic of the Binghamton (N. Y.) Railway. Mr. Brewster was graduated from Syracuse University, College of Applied Science, class of 1912, with the degree of electrical engi-

**S. J. Steiner** has been appointed engineer of maintenance of way of the Aurora, Elgin & Chicago Railroad, Aurora, Ill., to succeed **D. H. Howard**.

**W. L. Campbell** has recently been appointed purchasing agent of the Sterling, Dixon & Eastern Electric Railway, Dixon, Ill., to succeed **G. H. Ludeking**.

**J. J. Thames, Jr.**, has recently been appointed treasurer and auditor of the Macon Railway & Light Company, Macon, Ga., to succeed **Richard Ouder-sluis**.

**Frank R. Coates**, president of the Toledo Railways & Light Company, Toledo, Ohio, has been elected first vice-president of the National Baseball Federation.

**Oscar S. Straus**, nominated by Governor Whitman of New York to the Public Service Commission for the First District of New York to succeed himself, has been confirmed by the State Senate.

**W. J. Harvie**, treasurer and general manager of the Syracuse & Northern Electric Railway, Inc., Syracuse, N. Y., has in addition been elected vice-president of the company to succeed **T. C. Cherry**, now president of the company.

**Harry W. Alexander**, director of publicity of the Society for Electric Development, Inc., New York, N. Y., has resigned to become assistant to president on sales of the American Writing Paper Company, New York, and Holyoke, Mass.

**C. N. James**, formerly engineer of overhead construction of the St. Petersburg & Gulf Railway, St. Petersburg, Fla., is now a sergeant with the Fourth Company, Coast Artillery Corps, at Fort Dade, Fla. He plans to enter the school for electrician sergeants at Fortress Monroe, Va.

**T. C. Cherry** was elected president of the Syracuse & Northern Electric Railway, Inc., Syracuse, N. Y., on March 15. Mr. Cherry succeeds **C. Loomis Allen** as president of the road. He is vice-president of Allen & Peck, Inc., engineers and operators in charge of the operating management of the Syracuse & Northern Electric Railway, formerly known as the South Bay road.

**Roy B. Woolley** of the publicity and sales department of the Society for Electrical Development, Inc., New York, N. Y., but late of the American Ambulance Field Service, Verdun sector, France, has been appointed director of publicity of the society to succeed **Henry W. Alexander**, whose appointment to the position of assistant to president of the American Writing Paper Company, New York, N. Y., is noted elsewhere in this department.

**William Priest**, since March 1, 1907, division electrician of the Union Trac-

tion Company of Indiana at Muncie, has resigned to accept a position on the Coast. Mr. Priest has been connected with the Union Traction Company and its predecessors for nineteen years. He was working in the shops at Muncie in 1899 when the Citizens' Street Railway, Muncie, the City & Interurban Railway and the Anderson City Street Railway were consolidated and the line built between Muncie and Indianapolis. Mr. Priest continued at Muncie until the completion of the substations at that place and at Daleville, when he went to Daleville to operate the station. In the spring of 1901 he was transferred to the Marion substation, where he worked until the line was started between Indianapolis and Logansport. He was then transferred to Tipton to help install substations. Since then he has been engaged on construction work.

**C. H. Van Hooven**, claim agent of the Manila Electric Railroad & Light Corporation, Manila, P. I., who has been visiting the United States on a vacation and for the purpose of consulting with officers of the J. G. White Management Corporation, New York, N. Y., the operating managers of the Manila cor-



F. L. BREWSTER



C. H. VAN HOOVEN

neer. Immediately upon graduation he entered the employ of the New York State Railways at Syracuse as night man at one of the substations. A few months later he was transferred to day work at the Townsend Street substation. In the fall of 1912 he was made chief clerk to the master mechanic of the New York State Railways, and on Jan. 1, 1918, was appointed assistant master mechanic of the company. He resigned from the last-mentioned position to become connected with the Binghamton Railway.

**E. R. Kennedy** has recently been appointed master mechanic of the Cairo Railway & Light System, Cairo, Ill., to succeed **C. C. McGarvey**.

**G. S. White** has recently been appointed purchasing agent of the Chicago & Interurban Traction Company, Chicago, Ill., to succeed **C. E. Cox**.

**C. R. Harvey** has recently been appointed treasurer of the Fairburn & Atlanta Railway & Electric Company, Fairburn, Ga., to succeed **J. H. Longino**.

poration, is returning to the Philippines by way of Hawaii and Japan. While in the United States Mr. Van Hooven also devoted considerable time to inspecting the claim methods of electric railways in a number of large cities. He has been connected with the Manila Electric Railroad & Light Company for the last ten years. Mr. Van Hooven was recently admitted to the Philippine bar, having successfully completed the law course at Manila University.

**Gilbert Duffy**, formerly office manager in the engineering department of the Puget Sound Traction, Light & Power Company, Seattle, Wash., has been appointed secretary to the manager, succeeding **J. M. Wilmott**, who had been appointed sales manager for the coal mines.

**Theodore P. Shonts**, president of the Interborough Rapid Transit Company, New York, N. Y., contributed an article, "Sociology and Traction, City's New Rapid Transit Problem," to the magazine section of the New York Sun for



March 10. Mr. Shonts showed the relation between the growth of population and the increase of transportation facilities. He also considered what is in store for the traveling public of New York in the future.

J. R. Lowe has been appointed superintendent and assistant chief engineer of the San Diego & South Eastern Railway, San Diego, Cal. Mr. Lowe is thirty-five years old. He was connected with the Pacific Electric Railway for twelve years, the last eight years in charge of all field survey work in the maintenance of way department. Mr. Lowe is also superintendent and assistant chief engineer of the San Diego & Arizona Railway, which has consolidated with the San Diego & South Eastern Railway.

W. B. Jackson, for many years editor of the public utility column of the *Wall Street Journal*, and later with Claude Meeker, investment broker, is now associated with the bond department of Henry L. Doherty & Company, New York, N. Y. Mr. Jackson is regarded as one of the best posted newspapermen as regards not only public utilities, but various other corporations, as he is intimately acquainted with financing as well as operating problems.

C. Nesbitt Duffy, vice-president and general manager of the Manila Electric Railroad & Light Corporation, Manila, P. I., has been elected president of the board of directors of the Manila Merchants' Association. He succeeds Harold M. Pitt, who has held the office for five years. Mr. Duffy has been actively interested in the welfare of the organization since he entered the Manila business community. He served several years as vice-president of the board.

E. B. Sisson, formerly local superintendent of the Terre Haute, Indianapolis & Eastern Traction Company at Terre Haute, Ind., has been appointed assistant superintendent of transportation of the Chicago, South Bend & Northern Indiana Railway and the Southern Michigan Railway, with offices at South Bend, Ind. Mr. Sisson entered the service of the Terre Haute, Indianapolis & Eastern Traction Company in 1903 as interurban motorman, and was promoted to the position of inspector three years later.

J. D. Bowles has resigned as electrical superintendent of the Springfield Railway & Light Company, Springfield, Mo., to become connected with a manufacturing company. Mr. Bowles was graduated from Missouri University in 1909 with the degree B.S., and in 1910 received the degree E.E. He engaged in contracting work with a St. Louis and Chicago firm and then entered the service of the Public Service Commission of Missouri. He resigned from the commission to accept appointment to the company at Springfield.

William Baker, assistant chief engineer at the Anderson power plant of the Union Traction Company of Indiana for several years, has been appointed acting chief engineer to succeed Henry Comiskey, resigned. Mr. Baker was chief engineer for the Indiana Rolling

Mill Company from 1908 to 1912. After leaving the Indiana Rolling Mill Company he was appointed chief engineer of the so-called Honey Bee Company about one year before it was taken over by the Union Traction Company. From there he was transferred to the Anderson power plant as assistant chief engineer.

Robert F. Scott, Jr., is on an indefinite leave of absence from the Terre Haute division of the Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., of which he is engineer maintenance of way. Mr. Scott left on March 6 for an Atlantic port to take up his new duties as first lieutenant in the railway transportation division. He has been with the Terre Haute property in his present capacity for the last nine years, going there soon after his graduation from Princeton in the class of 1907. Mr. Scott is widely and popularly known in electric railway circles in the Central Electric Railway Association territory.

Robert S. Tomkins was recently appointed assistant treasurer of the Public Service Railway, Newark, N. J., to succeed Robert D. Miller, deceased. Mr. Tomkins entered the employ of the Jersey City & Bergen Railroad, now included in the system of the Public Service Railway, as a clerk in August, 1889. He continued in the employ of the railways in Jersey City until July, 1895, when he was made paymaster for the Consolidated Traction Company. He continued as paymaster of the North Jersey Street Railway, Jersey City, Hoboken & Paterson Street Railway and the Public Service Railway until he was appointed to succeed the late Mr. Miller.

J. R. Ong has resigned as electric railway engineer for the Railroad Commission of Wisconsin to accept the position of traffic engineer for the board of control of the Kansas City (Mo.) Railways. Mr. Ong was graduated from Purdue University in 1909. His practical railway experience began in car shops and power plants during the construction and early operating period of the Indianapolis & Cincinnati Traction Company and the Chicago, Lake Shore & South Bend Railroad. After he was graduated from Purdue Mr. Ong became an apprentice in the East Pittsburgh works of the Westinghouse Company and was later transferred to the Philadelphia sales office of the company. In 1911 he became superintendent of substations on the Fort Dodge, Des Moines & Southern Railway. In December, 1911, Mr. Ong accepted the appointment as electric railway engineer on the joint engineering staff serving the Railroad Commission of Wisconsin and the Wisconsin Tax Commission. In this position Mr. Ong has made extended studies for the Railroad Commission relating to operating matters and service on the electric railways of Wisconsin. The valuation of the electrical equipment of power plants and substations made by the engineering staff was also under Mr. Ong's direction.

## New Publications

### Finding and Stopping Waste in Modern Boiler Rooms

A reference manual to aid the owner, manager and boiler-room operator in securing and maintaining plant economy. Harrison Safety Boiler Works, Philadelphia, Pa. 274 pages. Flexible cloth, \$1.

Of special value in these times of fuel shortage is this little manual on a very live subject. In its sections are devoted to fuels, combustion, heat absorption, boiler efficiency and boiler testing, and boiler plant proportioning and management. A few pages at the end are taken up with clear diagrams of meters made by the company.

The book is replete with data and is liberally illustrated, principally with curves, showing the relations of the various quantities which have to do with combustion. The subject matter of the book was intended originally as an appendix to one of the company's catalogs, but during preparation it grew to such magnitude and took on such a comprehensive character that it was deemed advisable to put it into separate book form.

### The Calorific Power of Fuels

By Herman Poole. Third edition, rewritten by Robert Thurston Kent. John Wiley & Sons, Inc., New York, N. Y. 267 pages. Cloth, \$3 net.

In revising the text of the late Mr. Poole's work on fuels, Mr. Kent found that during the eighteen years since the last edition was published there have been so many advances that it was necessary practically to rewrite the book. In doing so he has utilized the researches of the United States Geological Survey and Bureau of Mines and has adopted as units the pound and the B.t.u., instead of the kilogram and calorie which were used in the earlier editions. In the new edition the measurement of the heating value of fuels and the results of a study of the general characteristics of available fuels are gone into very thoroughly. Numerous calorimeters are described with the aid of cross-sectional drawings. Each important commercial fuel is treated separately with full data of composition and combustion qualities. Valuable suggestions are also given as to the operation of furnaces, flue-gas analysis, etc. In an appendix is given the full text of the "Power Code" of the American Society of Mechanical Engineers. A number of steam and other standard tables are also included.

The conductor grabbed at her—  
I heard his teeth chatter  
As the pavement she struck with a flop.  
'Twas in very bad taste  
To alight in such haste,  
For the car had not come to a stop.  
—A-Z-U-R-I-D-E, Los Angeles Railway.



# Construction News

Construction News Notes are classified under each heading alphabetically by States. An asterisk (\*) indicates a project not previously reported.

## Recent Incorporation

\***Havre de Grace-Taneytown Electric Railway, Havre de Grace, Md.**—Incorporation papers for the Havre de Grace-Taneytown Electric Railway have been approved by the State Tax Commission. The company plans to construct a line from Havre de Grace to Taneytown, via Towson, Finksburg and Westminster, about 65 miles. Officers: C. Stanley Stirling, 423 Calvert Building, Baltimore, president; J. Frank Foster, Colara, vice-president; George O'Brien, secretary, and James P. Reese, 32 South Street, Baltimore, treasurer.

## Franchises

**Birmingham, Ala.**—The Alabama Interurban Railway has asked the Board of Revenue of Jefferson County for franchises covering its proposed line from Birmingham to the Warrior River. [March 16, '18.]

**Tampa, Fla.**—The Board of Public Works has granted permission to the Tampa Electric Company for the construction of an extension to the plant of the Tampa Shipbuilding & Engineering Company and the Oscar Daniels Company, and work will be begun immediately.

**Hammond, Ind.**—The city of Hammond has begun suit in the Indiana courts to compel the Chicago & Hammond Street Railway to forfeit a fifty-year franchise, obtained from the city in 1904, on account of insufficient service.

**Butte, Mont.**—The Butte Electric Railway has received a franchise from the City Council of Butte to construct an extension on Main Street from Galena Street to Quartz Street.

**Trenton, N. J.**—The Board of Public Utility Commissioners of New Jersey has approved the ordinance granted the Camden Horse Railroad by the town of Collingswood for the relocation of certain of its track and the establishment of double tracks in certain streets of Collingswood.

## Track and Roadway

**Little Rock Railway & Electric Company, Little Rock, Ark.**—The city of Little Rock has awarded a contract to the Missouri Valley Bridge & Iron Company, Leavenworth, Kan., at \$5,900,

for the construction of a steel and concrete viaduct 40 ft. long, 36 ft. wide at Eleventh Street and Summit Avenue. The cost of the viaduct will be divided between the city and the Little Rock Railway & Electric Company.

**Atlanta & Anderson Electric Railway, Atlanta, Ga.**—It is reported that steps have been taken by the Atlanta & Anderson Electric Railway, under the authority recently given by the Georgia Railroad Commission, to issue \$20,000,000 of 5 per cent, forty-year first mortgage bonds for construction purposes, with the Empire Trust Company of Atlanta as trustee. According to the report, the building of the company's line from Atlanta, Ga., to Anderson, S. C., about 140 miles, has been postponed until business conditions have improved. J. L. Murphy, Atlanta, president. [Dec. 8, 1917.]

**Chatham County Traction Company, Savannah, Ga.**—Construction will be begun at once by the Chatham County Traction Company on its line from Stiles Avenue to the Brampton tract. [March 9, '18.]

**Fort Madison (Iowa) Street Railway.**—Work will soon be begun by the Fort Madison Street Railway on the construction of an extension on Jefferson Avenue and Santa Fe Avenue, terminating at Second Avenue.

**Trenton, Lakewood & Seacoast Railway, Trenton, N. J.**—Chancellor Walker has signed an order requiring the Trenton, Lakewood & Seacoast Railway to show cause at Long Branch, N. J., why a receiver should not be appointed for the company. The order carries with it a preliminary injunction restraining the company from disposing of any of its assets pending the receivership application, which is made by Frank Tilford, New York, a bondholder. The company was formed to build an electric railway from Trenton to Lakewood and Point Pleasant, via Allentown, 40 miles, but no construction work has been done on the line. [June 2, 1917.]

**Interborough Rapid Transit Company, New York, N. Y.**—Henry Bruckner, Borough President of the Bronx, will present to the Board of Estimate plans for an extension of the new Lexington Avenue subway route clear through to City Island. According to an estimate made by Louis F. Haffen, Borough Engineer, the extension would cost about \$1,000,000. Plans for the new structure, drawn by Mr. Haffen, were submitted some time ago to the Public Service Commission for the First District of New York and turned over by that body to Chief Engineer Turner for investigation and report. Under Mr. Haffen's plan the new extension would cross Eastchester Creek to Rodman's Neck, thence across Pelham Bay

to City Island. Practically all of the land along the proposed extension is at present owned by the city.

**Philadelphia, Pa.**—Bids were opened on March 5 by the Department of City Transit of Philadelphia for furnishing and delivering cast-iron fillet brackets for columns in Frankford Avenue between Church Street and Dyre Street, the lowest bidder being George B. Clopp, Philadelphia, at \$7,820.

**Dallas (Tex.) Railway.**—Work is under way by the Dallas Railway on the double-tracking of the Ervay Street line to the city limits and the double-tracking of the Columbia Avenue line. The company is experiencing great difficulty in securing laborers for carrying forward its program of improvements and betterments under the terms of its franchise.

**Seattle (Wash.) Municipal Railway.**—Plans have been submitted by City Engineer A. H. Dimock to the Board of Public Works for a proposed elevated line to the shipyards. As planned, the line will extend from First Avenue South and Washington Street to West Spokane Street and West Waterway and will permit more rapid transit to Riverside, the ship yards and West Seattle. The cost is estimated at about \$350,000.

## Shops and Buildings

**Gadsden, Bellevue & Lookout Mountain Railway, Gadsden, Ala.**—Lightning recently caused the destruction of the carhouse of the Gadsden, Bellevue & Lookout Mountain Railway at Gadsden, together with three electric cars. The loss is estimated at several thousand dollars. It is proposed to reconstruct the carhouse at once.

**Northern Ohio Traction & Light Company, Akron, Ohio.**—Plans are being made by the Northern Ohio Traction & Light Company for the construction of new warehouses, laboratory, clubhouse and other buildings at Akron at a cost of about \$200,000.

## Power Houses and Substations

**New York & Queens County Railway, New York, N. Y.**—This company has abandoned its former power plant at Long Island City fronting the East River, and has leased the property to the Maritime Warehouse Corporation.

**Lehigh Valley Transit Company, Allentown, Pa.**—Construction work has been completed on a tie line between the systems of the Lehigh Valley Transit Company and the Pennsylvania Utilities Company at Easton, a section of the line being constructed for 13,200 volts and the remainder for 33,000 volts. The new line will provide for an interchange of about 1200 kw. and will facilitate matters in the event of a breakdown on either system.

# Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

## Lubricants and Oils Rapidly Advancing

Sale to Public Utilities Increases 50 Per Cent—Market in Upset Condition

The raw material—that is, crude oil—from which most of the machine lubricants are derived is not only high but is becoming scarce, refiners say. At least, it is not so easily obtainable as it was even a year ago. With a continually advancing market, the latest increase a few days ago, 25 cents a barrel, brings crude up to \$4 a barrel for Pennsylvania oil. There has also been an increase of 36 per cent on Southwestern crude. As one of the best-known refiners or manufacturers explained the situation to the *ELECTRIC RAILWAY JOURNAL* last week, an abnormal demand on crude stocks has drawn the reserve down rapidly. Last year 30,000,000 bbl. were taken from storage for domestic consumption; 50,000,000 bbl. were exported, 7,000,000 bbl. were imported and placed in storage.

Nevertheless, with apparently heavy stocks in various parts of the country, the danger line of insufficient crude for refining into lubricants and for other commercial purposes is not far off at the present rate of consumption, it is held. For transformer and other oils, which must be of the highest grade, for motors, dynamos, generators, turbines, and in fact all electrical machinery, prices are not only high but are constantly advancing. The last increase, which occurred two or three weeks ago, was 10 per cent. The supply of wood barrels is growing short, labor is difficult to retain, and the cost of delivery, declare refiners, is another controlling factor in to-day's refined-oil market. Manufacturers report great difficulty in securing proper quantities of oil to fill transformer orders. This situation is mostly due, it was said, to rail embargoes. The government is taking tremendous amounts of crude for fuel oil. In truth, its requirements dominate the oil market; or, as one representative refiner phrased it, oil will win the war. In 1915 crude oil sold at 9 cents. Now it sells at 20 cents, and at least 100 new refineries are under construction. Turbine and transformer oils absorbed at least 10 per cent of the surplus stock of crude oil. There is a comparatively easy market, deliveries are better, and government control would be an advantage. Further, according to the same authority, there has been fully 50 per cent increase in the sale of various fine oils for use by public util-

ties. Still another lubricant manufacturer stated that there has been from 10 to 50 per cent increase in the demand for electrical machinery oils and that deliveries were too uncertain even to talk about.

## Recent Advance in Price of Car Seatings

Entire Line Affected—Scarcity of Basic Material—Some Goods Have Doubled in Cost

Material used in the construction of car seats and seatings is occasioning more or less uneasiness on account of the growing scarcity. Rattan covering, which comes from Singapore, is most uncertain, and the situation is becoming acute. Prices have not only advanced, but the goods are in short supply. Plush and leather have doubled in cost, and artificial leather has followed closely. According to one of the several manufacturers of car seats, who operate on a large scale, and are accustomed to carrying heavy reserve stocks of raw material, market conditions are fluctuating continually so much so that an increase of from 10 to 15 per cent was found necessary within the last few weeks.

Deliveries of malleable iron fixtures have been held up at all the foundries. The situation is not so acute as it was a few months ago, and some slight relief has been had, but the freight embargoes are still hindering shipments. In fact, as another manufacturer stated, some commodities in this class had been delayed fully six months.

Every manufacturer of recognized standing in the trade dwells upon the high cost of essential material; and while, as in other lines, some factories, anticipating their wants, are better prepared than others to meet emergency or hurried orders, it is conceded that the price advance is general and made obligatory by prevailing conditions.

## Denver Sells Boilers

The tremendous demand for boilers is shown by some sales which have recently been made by companies which have been able to reduce their steam-generating capacity through more efficient operation. One of these is the Denver Tramway Company which reports the sale recently of five boilers of 415 hp. of the Sterling type, equipped with chain grate fittings, etc., to the Pennsylvania Shipbuilding Company at \$30 a horsepower. The boilers were installed in Denver about thirteen years ago, and the total amount received for them was \$62,250.

## When the Purchasing Agent Should Use Foresight

A Supply Man Who Believes Deliveries Would Be Assisted If Requirements Were Anticipated

Doubtless the patience of everyone is tried to the breaking point when suspended shipments and delayed deliveries affect the arrival of needed car equipment and supplies. When priority orders and the difficulties of transportation at the present time are considered it may be borne in mind that every effort is being made to secure to the customer the best delivery time. In order to minimize confusion and make sure of receiving the immediately necessary articles a little foresight on the part of purchasing agents, storekeepers, or buyers in general would be of assistance. The buying trade has been repeatedly admonished to look the situation squarely in the face and anticipate sufficient requirements with consideration for prevailing delivery dates. Otherwise, according to the complaint, even reasonable deliveries cannot be effected.

In this connection a leading supply man takes occasion to criticize the dilatoriness of purchasing agencies in placing orders without due regard for current unavoidable delays in shipping and deliveries. The letter reads in part as follows:

"There is a matter which we think worthy of a little editorial attention, namely, the storekeeper or purchasing agent who waits until he is all out of a certain vitally necessary part before placing a requisition or order for the same; and who then proceeds to make the life of the supply man miserable with imploring and then threatening letters and telegrams regarding delivery. In these war times, with shortages in labor and raw materials and maddening freight and express delays and embargoes, prompt shipments and deliveries are not to be expected.

"If the railways would anticipate their future needs and place orders for these materials a reasonable period in advance of their actual requirements (specifying, if necessary, that deliveries were not desired before certain dates), they would have the material in their storeroom when required and not have to lay up equipment because of its non-receipt, and would actually save money at the same time, as in the endeavor to make prompt shipments and deliveries, manufacturers are obliged to offer exorbitant wages to workmen and to ship goods by express instead of by freight, and the consumer pays the excess, you may be sure."

# Electric Hoist Manufacturers Complete Organization

Officers Selected and the Aims and Objects of the New Association Formulated

Believing that the experimental stage has been well passed and acceptable designs developed the various manufacturers of electric hoists have organized as the Electric Hoist Manufacturers' Association. The manufacturers of the United States, which comprise the new body, propose to co-ordinate and make available for the user all that is best in electric hoist design and practice. The following companies make up the membership:

- Brown Hoisting Machinery Company.
- Detroit Hoist & Machine Company.
- Euclid Crane & Hoist Company.
- Franklin-Moore Company.
- Link-Belt Company.
- Roeper Crane & Hoist Works.
- Shepard Electric Crane & Hoist Company.

Sprague Electric Works of the General Electric Company.

Yale & Towne Manufacturing Company.

The officers of the association are as follows: F. A. Hatch, chairman, Shepard Electric Crane & Hoist Company; F. W. Hall, vice-chairman, Sprague Electric Works; C. W. Beaver, secretary-treasurer, Yale & Towne Manufacturing Company.

The association holds monthly meetings for the purpose of studying the specific needs of the hoist user. It will consider uniform nomenclature pertaining to types and parts of electric hoists, fix upon a standard by which hoist motors shall be rated and promote their standardization as far as possible. It will also collect and disseminate information and statistics relative to the industry. The membership of the association is confined to those engaged in the manufacture of monorail electric hoists.

## Australian Railways Buy American Shop Equipment

American manufacturers should study carefully the market for railway shop machinery and tools in Australia and New Zealand, says a report completed to-day for the Bureau of Foreign and Domestic Commerce, Department of Commerce, by Commercial Agent Frank Rhea. Of all the various lines of railway equipment and supplies in use in those countries, machinery and tools are first in volume of imports from the United States.

Other supplies and equipment for the state railways are purchased to some extent in America, because in some respects railway conditions in Australia and New Zealand are similar to those in the United States, but the tendency is to manufacture at home all possible supplies. In shop machinery and tools the American manufacturer, by reason of the recognized excellence of his product, is able to compete more successfully with European and domestic

concerns than in any other line, as shown by the business done in the past.

Copies of "Railway Materials, Equipment and Supplies in Australia and New Zealand," Special Agents Series No. 156, can be obtained at 25 cents a copy from the Superintendent of Documents, Government Printing Office, Washington, D. C., or from any of the district or co-operative offices of the Bureau of Foreign and Domestic Commerce.

## Rolling Stock Deliveries

Further Evidence That Six Months or So Is Prevailing Time for Order

Many reports have been abroad concerning long deliveries of electric railway cars which the manufacturers state are entirely contrary to fact. In this

connection, W. H. Heulings, Jr., vice-president and general sales manager of the J. G. Brill Company of Philadelphia, has made the following statement for the ELECTRIC RAILWAY JOURNAL:

"The situation hasn't changed any for some time and a delivery of about six months is the prevailing time. We could make deliveries in six months from the time of receipt by us with the complete information to enable us to proceed, but we cannot make deliveries in six months from the time the order is first talked of or closed unless the manufacturing data are forthcoming without any loss of time."

This confirms the statement of Nic LeGrand, general sales agent of the St. Louis Car Company, which appeared in the March 2 issue of the ELECTRIC RAILWAY JOURNAL, in which the prevailing delivery period was given as five to six months upon receipt of the order.

## Rolling Stock

Saginaw-Bay City Railway, Saginaw, Mich., is mentioned in the March 2 number of the ELECTRIC RAILWAY JOURNAL as ordering seven double-end double-truck city cars from the St. Louis Car Company, which are to be delivered in four months. The specifications follow:

Number of cars ordered.....	7
Name of road.....	Saginaw-Bay City Ry. Co.
Date order was placed.....	Jan. 20, 1918
Date of delivery.....	4 months
Builder of car body.....	St. Louis Car Co.
Type of car.....	28-in. double end double truck semi-steel
Seating capacity.....	40
Weight (total).....	36,000 lb.
Length over bumpers.....	42 ft. 4 in.
Length over vestibule.....	4 ft. 0 in.
Width over all.....	41 ft. 0 in.
Body.....	Semi-steel
Interior trim.....	Mahogany
Headlining.....	3-ply poplar
Roof.....	Arch
Air brakes.....	Westinghouse
Bumpers.....	Hedley Anti-Climber
Car trimmings.....	St. Louis Car Co.
Control type.....	K
Couplers.....	St. Louis Car Co.
Curtain fixtures.....	Curtain Supply Co.
Curtain material.....	Pantasote
Designation signs.....	St. Louis Car Co.
Door operating mechanism.....	St. Louis Car Co.
Fenders.....	Root
Hand brakes.....	St. Louis Drop Handle
Heaters.....	P. Smith Hot Air
Headlights.....	Ohio Brass Co.
Journal boxes.....	St. Louis Car Co.
Registers.....	R-5 Int.
Sanders.....	St. Louis Car Co.
Sash fixtures.....	St. Louis Car Co.
Seats, style.....	Hale & Kilburn
Seating material.....	Rattan
Step treads.....	Teralin
Trolley catchers.....	Ohio Brass Co.
Trucks, type.....	St. Louis Max Tract. No. 106a
Ventilators.....	St. Louis Car Co.
Buzzers.....	Faraday
Track scrapers.....	Root "Air"

Hudson & Manhattan Railroad, New York, N. Y., which operates the tunnel and subway system under the Hudson River and in New York, as well as the line from Jersey City to Newark, N. J., now under the control of the government, is reported to be making preparations to construct a spur to Port Newark and intermediate shipbuilding points for the transportation of the workmen. From sixty to 100 new all-steel cars are also being considered in the same connection, specifications for which, it

is stated, have been requested by the Emergency Fleet Corporation. When the work and equipment are finally decided upon it will go forward at top speed.

Brooklyn (N. Y.) Rapid Transit Company has requested cost specifications on fifty new center-entrance trail cars.

Washington Railway & Electric Company, Washington, D. C., is reported about ready to place an order for from twenty-five to thirty-five new cars.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., has asked car builders for quotations on ten one-man city car bodies for the Lafayette division, but it proposes to use the present trucks and equipment. The company also has received proposals on twenty-five one-man cars complete, eight for Logansport and seventeen for the Fort Wayne division.

Saginaw-Bay City Street Railway, Saginaw, Mich., which was referred to in the ELECTRIC RAILWAY JOURNAL of March 2 as ordering fourteen one-man cars from the St. Louis (Mo.) Car Company, has specified the following equipment:

Number of cars ordered.....	14
Name of road.....	Saginaw-Bay City
Date order was placed.....	Jan. 20, 1918
Date of delivery.....	Four months
Builder of car body.....	St. Louis Car Co.
Type of car.....	One-man
Seating capacity.....	30
Weight (total).....	14,000 lb.
Length over bumpers.....	27 ft. 9 1/2 in.
Width over all.....	8 ft.
Body.....	Semi-steel
Interior trim.....	Birch
Headlining.....	Three-ply veneer
Roof.....	Arch
Air brakes.....	Westinghouse
Car trimmings.....	St. Louis
Curtain fixtures.....	Curtain Supply Co.
Curtain material.....	Pantasote
Designation signs.....	St. Louis
Fenders or wheelguards.....	Root
Hand brakes.....	St. Louis
Heaters.....	Smith Hot Air
Headlights.....	Ohio Brass
Journal boxes.....	St. Louis
Registers.....	Int. R5
Sanders.....	St. Louis
Sash fixtures.....	St. Louis
Seats, style.....	St. Louis
Seating material.....	Rattan
Step treads.....	Feralum
Trolley catchers or retrievers.....	O. B.
Trucks, type.....	St. Louis 72A
Ventilators.....	St. Louis
Wheels (type and size).....	26-in. Grey
Special devices, etc.....	Safety control

Slate Belt Electric Railway, Pen Argyl, Pa., mentioned in last week's **ELECTRIC RAILWAY JOURNAL** as ordering interurban cars from the J. G. Brill Company, has furnished the following specifications:

Number of cars ordered.....4  
 Name of road.....Slate Belt Electric Ry. Co.  
 Date order was placed.....Feb. 21, 1917  
 Builder of car body.....J. G. Brill Co.  
 Type of car.....Combination passenger and smoking, convertible bodies  
 Seating capacity.....48  
 Weight (total).....48,800 lb.  
 Bolster centers, length.....24 ft. 0 in.  
 Length over bumpers.....47 ft. 0 in.  
 Length over vestibule.....46 ft. 0 in.  
 Width over all.....8 ft. 5 in.  
 Height, rail over trolley board.....11 ft. 4 1/4 in.  
 Body.....Semi-steel  
 Interior trim.....Cherry  
 Headlining....."Agasote"  
 Roof.....Plain arched  
 Air brakes.....Westinghouse  
 Axles....."EB" Hammered steel  
 Bumpers.....J. G. Brill Co.  
 Car trimmings.....J. G. Brill Co.  
 Control, type....."H. L." (Westinghouse)  
 Couplers.....Portable draw bar  
 Curtain fixtures.....Curtain Supply Co.  
 Curtain material.....Pantasote  
 Designation signs.....Illuminated  
 Door operating mechanism.....Brill Manual  
 Gears and pinions.....Westinghouse  
 Hand brakes.....Brill standard  
 Heaters....."Peter Smith" hot water  
 Journal boxes.....Brill standard  
 Motors.....Westinghouse No. 306, inside hang  
 Paint, varnish.....J. G. Brill Co. standard  
 Registers.....Ohmer  
 Sanders.....Universal Air  
 Sash fixtures.....O. M. Edwards Co.  
 Seats, style.....Brill standard "Winner"  
 Seating material.....Plush in passenger and  
 Fabrikoid smoking compt.  
 Springs.....Brill standard  
 Step.....Oak with "Feralum" tread  
 Trucks, type.....Brill 27 MCB2X  
 Ventilators.....Automatic Ventilators Co.  
 Wheels (type and size).....33-in. cast steel

Pittsburgh (Pa.) Railways has just had delivered the last of the fifty cars ordered from the St. Louis Car Company last year.

Gadsden, Bellevue & Lockout Mountain Railway, Gadsden, Ala., had its carhouse and three passenger cars destroyed, with a fourth badly damaged by fire, on March 6, which was caused by lightning. The loss was several thousand dollars. The cars will be replaced as soon as possible, and the carhouse rebuilt at once.

Washington-Virginia Railway, Washington, D. C., recently acquired from the J. G. Brill Company two interurban cars originally ordered for the Slate Belt Electric Street Railway, Pen Argyl, Pa., as mentioned in last week's issue of the **ELECTRIC RAILWAY JOURNAL**. The specifications are the same in both cases, with the exception that in the Washington company cars there were a few minor changes, the most im-

portant being the substitution of seats upholstered in cane for both the smoking and passenger compartments.

Cincinnati & Columbus Traction Company, Cincinnati, Ohio, reports it needs a motor-equipped freight car of 50,000 to 60,000 lb. capacity.

Wason Manufacturing Company, Springfield, Mass., advises the **ELECTRIC RAILWAY JOURNAL** it has had no order for trail trucks from the Cumberland County Power & Light Company, Portland, Me., for a year. This matter was referred to in this column last week.

Illinois Traction System, Peoria, Ill., is speeding up the repair of electric motors which were disabled during the recent winter blizzards. The company had about thirty electric locomotives, which were so damaged during the storms that their further use was prohibited until extensive repairing had been done.

West Penn Railways, Pittsburgh, Pa., has recently placed an order for twenty-nine all-steel, double-truck, double-end city cars, to be used on its lines in Wheeling, W. Va. Also nine semi-steel, center-entrance, interurban cars for interurban service between Wheeling, W. Va., and Steubenville, Ohio. Also four semi-steel, center-entrance interurban cars for use on its lines in the coke region of Pennsylvania. The cars will be built by the Cincinnati Car Company.

### New Advertising Literature

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.: Pamphlet containing articles on heavy traction by F. H. Shepard, which appeared in recent issues of the *Electric Journal*.

National Pneumatic Company, New York and Chicago: A pamphlet entitled "Maximum Revenue Mileage from the Electric Railway Car." This publication reviews the many advantages of pneumatic door and step control from the standpoints of increased mileage, greater safety, better fare collection, decreased car upkeep, elimination of manual labor and cultivation of public good will.

### Trade Notes

Easton Car & Construction Company, Easton, Pa., announces the opening of a branch office in Washington.

Fred B. Duncan has been appointed manager of the Chicago office of the Packard Electric Company, Warren, Ohio.

Union Smelting & Refining Company, Newark, N. J., has moved into its new plant at Avenue L and St. Charles Street.

Gulick-Henderson Company, Inc., New York, N. Y., inspector engineer, has removed its offices from 21 Park Row to the Herald Square Building, 141-145 West Thirty-sixth Street, in order to provide larger and more suitable quarters.

Economy Electric Devices Company, Chicago, has sold to the Fort Wayne & Northern Indiana Traction Company its energy checking devices, Sangamo economy meters, for installation on the cars of the Fort Wayne-Decatur 1200-volt interurban line.

National Pneumatic Company, New York and Chicago, is to equip the 100 new double-end cars of the Philadelphia Rapid Transit Company with its 2 1/2 x 4 1/2 National pneumatic door engines, door shafts and other door and step control fittings complete. National pneumatic interlocking safety door control is also provided to be operative for either single or two-car operation. In train operation the conductor at the rear of the first car will also control the front doors of the following car.

Chicago (Ill.) Varnish Company has placed on the market a new enameling system for car painting under the trade name of Enamelite Ce Ve System. This new system is clearly a war time process which makes possible high grade painting and finishing of cars at a marked saving in the cost of labor and material. The new system of painting is equally as applicable to wood and steel car bodies. It embodies the undercoats of the well-known Ce Ve process and a double coat of Enamelite enamel, giving a very durable finish to the body without sacrificing any of the quick drying qualities for which the Ce Ve process has become noted.

### RAILWAY MATERIALS

	Mar. 13	Mar. 20
Rubber-covered wire base, New York, cents per lb.	27-30	27-30
Weatherproof wire (100 lb. lots), cents per lb.		
New York	28 1/4 to 34 1/4	28 1/4 to 34 1/4
Weatherproof wire (100 lb. lots), cents per lb.		
Chicago	33.42 to 38.35	33.42 to 38.35
Rails, heavy, Bessemer, Pittsburgh	\$55.00	\$55.00
Rails, heavy, O. H. Pittsburgh, per gross ton	\$57.00	\$57.00
Wire nails, Pittsburgh, per 100 lb.	\$3.50	\$3.50
Railroad spikes, 9/16 in., Pittsburgh, per 100 lb.	\$3.90	\$3.90
Steel bars, Pittsburgh, per 100 lb.	\$5.00	\$5.00
Sheet iron, black (24 gage), Pittsburgh, per 100 lb.	\$4.90	\$4.90
Sheet iron, galvanized (24 gage), Pittsburgh, per 100 lb.	\$5.80	\$5.80
Galvanized barbed wire, Pittsburgh, cents per lb.	\$4.35	\$4.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.	\$3.95	\$3.95
Cement (carload lots), New York, per bbl.	\$2.25	\$2.25
Cement (carload lots), Chicago, per bbl.	\$2.31	\$2.31
Cement (carload lots), Seattle, per bbl.	\$2.65	\$2.65
Linseed oil (raw, 5 bbl. lots), New York, per gal.	\$1.53	\$1.58
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	\$1.54	\$1.59
White lead (100 lb. keg), New York, cents per lb.	10	10
Turpentine (bbl. lots), New York, cents per gal.	44 1/2	44 1/2

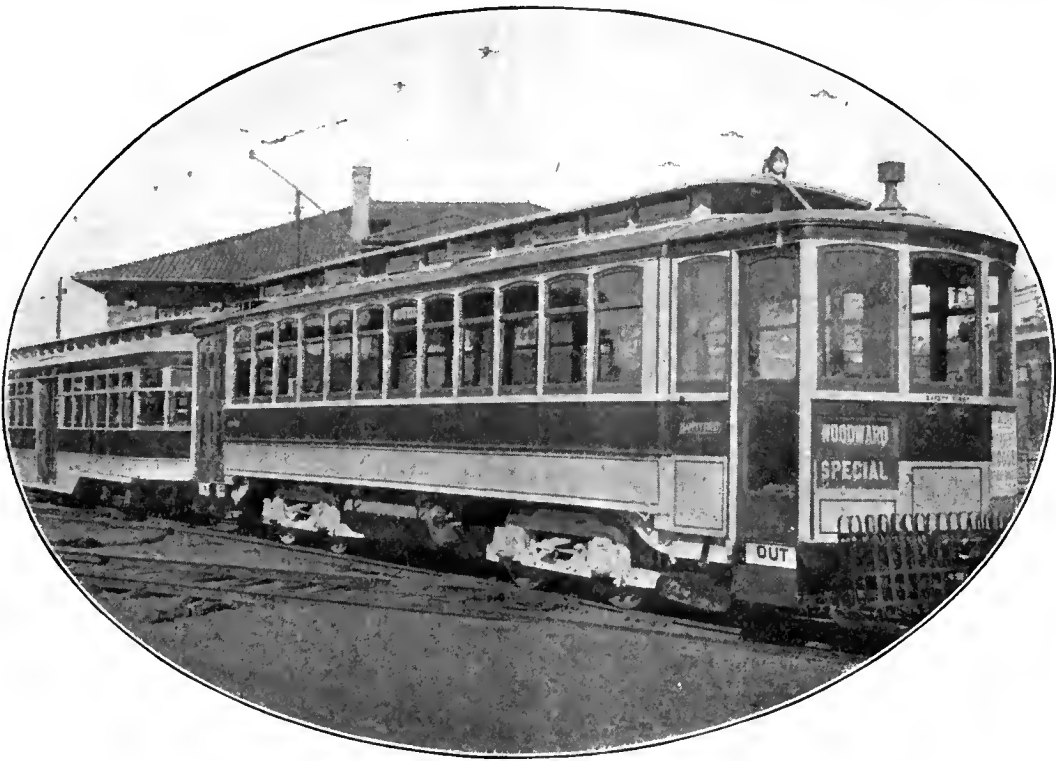
### NEW YORK METAL MARKET PRICES

	23 1/2	23 1/2
Copper, ingots, cents per lb.	23 1/2	23 1/2
Copper wire base, cents per lb.	26 1/4 to 26 3/4	26 1/4 to 26 3/4
Lead, cents per lb.	7 1/4	7 1/4
Nickel, cents per lb.	50	50
Spelter, cents per lb.	7 1/2	7 1/2
Tin, Straits, cents per lb.	\$85.00	\$85.00
Aluminum, 98 to 99 per cent, cents per lb.	†32	†32

### OLD METAL PRICES—NEW YORK

	Mar. 13	Mar. 20
Heavy copper, cents per lb.	22	22
Light copper, cents per lb.	19 1/2	19 1/2
Red brass, cents per lb.	18	18
Yellow brass, cents per lb.	13	13
Lead, heavy, cents per lb.	6	6.38
Zinc, cents per lb.	5 1/2	5 1/2
Steel car axles, Chicago, per net ton	\$42.41	\$42.41
Old car wheels, Chicago, per gross ton	\$30.00	\$30.00
Steel rails (scrap), Chicago, per gross ton	\$35.00	\$35.00
Steel rails (relaying), Chicago, per gross ton	\$60.00	\$60.00
Machine shop turnings, Chicago, per net ton	\$17.00	\$17.00





## IT'S THE PEACOCK

### At Detroit Where They Operate 24-Hour Train Service

Do you know that the density of traffic on Woodward Avenue, 4,640,000 passengers per mile of single track, is exceeded only by that of the Interborough Subway of New York?

That's why two-car trains have to be operated twenty-four hours a day full-up most of the time. Such service surely puts a mighty strain on the equipment!

Yet that's just what Detroit has had to do because of its phenomenal growth in recent years.

When you know that Peacock Brakes are on practically all Detroit cars,  
763 OF THEM,

You know that this tremendous density of traffic for surface railway operation is being handled with safety to the passenger and safety to the pedestrian.

There is no service too hard for Peacock Brakes.



The Eccentric  
Drum

## National Brake Co.

Buffalo, N. Y.



# Bankers and Engineers



## STONE & WEBSTER

Industrial Plants and Buildings, Steam Power Stations,  
Water Power Developments, Substations, Gas Plants,  
Transmission Lines, Electric and Steam Railroad Work.  
NEW YORK BOSTON CHICAGO

## THE J. G. WHITE COMPANIES

ENGINEERS  
FINANCIERS



CONTRACTORS  
OPERATORS

43 EXCHANGE PLACE . . . . NEW YORK  
LONDON CHICAGO

## SANDERSON & PORTER ENGINEERS

REPORTS • DESIGNS • CONSTRUCTION • MANAGEMENT  
HYDRO-ELECTRIC DEVELOPMENTS  
RAILWAY, LIGHT AND POWER PROPERTIES  
CHICAGO NEW YORK SAN FRANCISCO

## WOODMANSEE & DAVIDSON ENGINEERING CO. ENGINEERS

MILWAUKEE  
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ENGINEERS—CONSTRUCTORS  
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105 SOUTH LA SALLE STREET  
CHICAGO

## H. M. Byllesby & Company, Inc.

NEW YORK CHICAGO TACOMA  
Trinity Bldg. No. 208 So. La Salle St. Washington

Purchase, Finance, Construct and Operate Electric Light,  
Gas, Street Railway and Water Power Properties.  
Examination and reports. Utility Securities Bought and Sold.

ALBERT S. RICHEY  
ELECTRIC RAILWAY ENGINEER  
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## A. L. DRUM & COMPANY CONSULTING AND CONSTRUCTING ENGINEERS

VALUATIONS AND FINANCIAL REPORTS  
CONSTRUCTION AND MANAGEMENT  
OF ELECTRIC RAILWAYS

76 West Monroe St.

CHICAGO, ILL.

## JOHN A. BEELER

OPERATING AND RATE INVESTIGATIONS  
TRAFFIC SURVEYS AND SCHEDULES  
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VANDERBILT SUPERVISION OF CONSTRUCTION District Bldg.  
AVE. ENGINEERING Washington,  
NEW YORK APPRAISALS D. C.

## JAMES T. SWAN CERTIFIED PUBLIC ACCOUNTANT

60 STATE ST., BOSTON

SPECIALIST IN TRANSPORTATION STATISTICS  
AND RATE INVESTIGATIONS

## D. C. & WM. B. JACKSON ENGINEERS

CHICAGO BOSTON  
HARRIS TRUST BLDG. 248 BOYLSTON ST.  
Plans, Specifications, Supervision of Construction  
General Superintendence and Management  
Examinations and Reports  
Financial Investigations and Rate Adjustments

## Ford, Bacon & Davis, Engineers.

115 BROADWAY

New Orleans NEW YORK San Francisco

## Sloan, Huddle, Feustel & Freeman Consulting Engineers

Analytical Studies of financial and operating conditions,  
appraisals and rate adjustments of electric railway and  
all public utility properties.

BOSTON, 14 Kilby Street CHICAGO, Conway Bldg.

## THE SEARCHLIGHT SECTION

will find { The man  
The position } you want  
The plant

PUT YOUR AD IN THE SEARCHLIGHT

When writing the advertiser for information or prices, a men-  
tion of the Electric Railway Journal would be appreciated.

ELECTRICAL TESTING LABORATORIES  
Electrical, Photometrical and  
Mechanical Testing.

80th Street and East End Ave., New York, N. Y.

## THE P. EDW. WISCH SERVICE

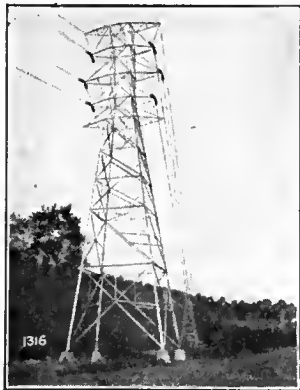
Suite 710 DETECTIVES Suite 715  
Park Row Bldg., New York Board of Trade Bldg., Boston

Scofield Engineering Co. Consulting Engineers  
POWER STATIONS PHILADELPHIA, PA.  
HYDRAULIC DEVELOPMENTS GAS WORKS  
ELECTRIC RAILWAYS

AMERICAN BRIDGE COMPANY

HUDSON TERMINAL-30 CHURCH STREET, NEW YORK

Manufacturers of Steel Structures of all classes  
particularly BRIDGES AND BUILDINGS



Transmission Tower, Pittsburgh, Pa.  
Duquesne Light Company

SALES OFFICES

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Philadelphia, Pa. . . Widener Building	Denver, Colo., First Nat'l Bank Building
Boston, Mass. . . John Hancock Bldg.	Salt Lake City, Utah, Walker Bank Bldg.
Baltimore, Md., Continental Trust Bldg.	Duluth, Minn. . . . . Wolvin Building
PITTSBURGH, PA. . . Frick Building	Minneapolis, Minn., 7th Ave & 2nd St., S.E.
Buffalo, N. Y. . Marine National Bank	
Cincinnati, Ohio, Union Trust Building	Pacific Coast Representative:
Atlanta, Ga. . . . . Candler Building	U.S. Steel Products Co. Pacific Coast Dept.
Cleveland, Ohio . . Guardian Building	SAN FRANCISCO, CAL., Rialto Building
Detroit, Mich., Beecher Ave. & M. C. R. R.	Portland, Ore. . . . . Selling Building
CHICAGO, ILL., 208 South La Salle St.	Seattle, Wash., 4th Ave. So. Cor. Conn. St.

Export Representative:

United States Steel Products Co., 30 Church St., N. Y.

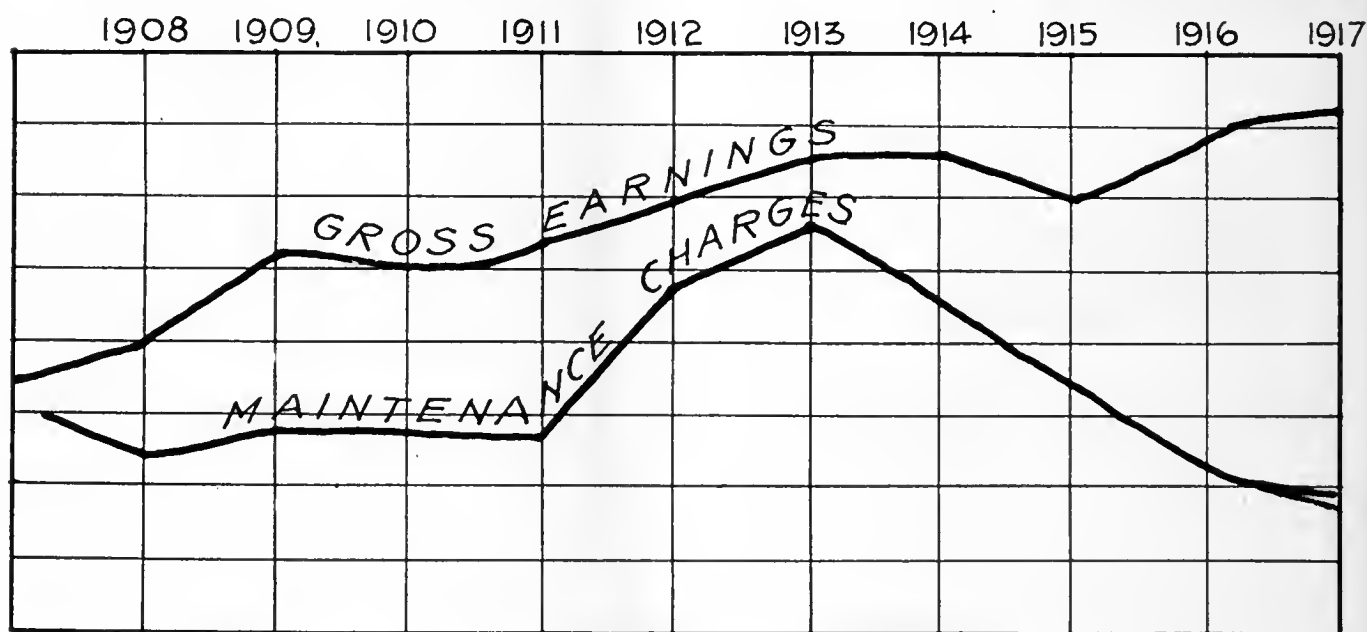
# ENGLAND and GERMANY

despite their stupendous efforts in carrying on the greatest war in the world's history, still have *time* and *thought* and *money* for carrying on ambitious *trade plans* which will ripen, after the war so suddenly as to gain for the victor at least a year on the rest of the world.  
Manufacturers who because of their

rush of work at this time devote neither *time* nor *thought* nor *money* to the building up of a trade which takes into account the period "after the war," will find themselves hopelessly in the rear when the great war barrier falls and the nations of the world start anew their perpetual race for commercial supremacy.

Don't sit back on your *past* achievements  
Don't bank on past customers  
Keep your name and your product before them  
*Lest they forget!*

# While One Goes Up The Other Comes Down



**This chart represents graphically the balance sheet of a certain railroad between 1908 and 1917**

The Indianapolis Welder came into general use in 1912.

The railroad bought one at the end of that year.

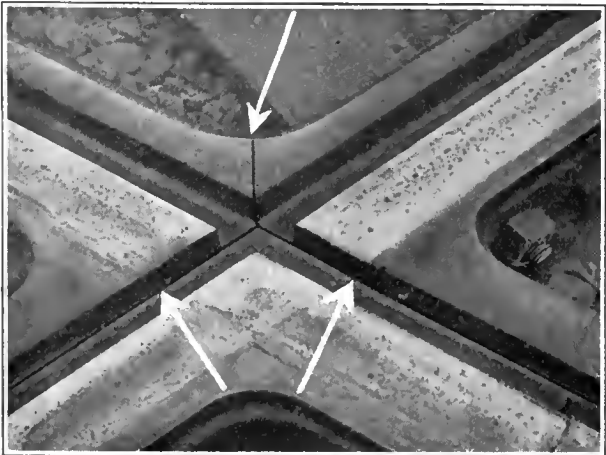


Study the toboggan slide which started on January 1, 1913, and is still "going down."

**Indianapolis Switch & Frog Company, Springfield, Ohio**



What Happens to a Rolled Rail Crossing



Joints in Balkwill Articulated Cast Manganese Crossings are life savers. They positively prevent breakage at flangeway intersections, permitting 100% wear before renewal

# Why Balkwill Articulated Cast Manganese Crossings Are Superior to Rolled Rail Crossings

This picture at the left shows where breaks in the main steel filling or backbone of rolled rail crossings are usually found.

These breaks are unavoidable because of the lack of flexibility of the rolled steel filler at the flangeway intersection.

In the Balkwill Articulated Cast-Manganese Crossing the difficulty is

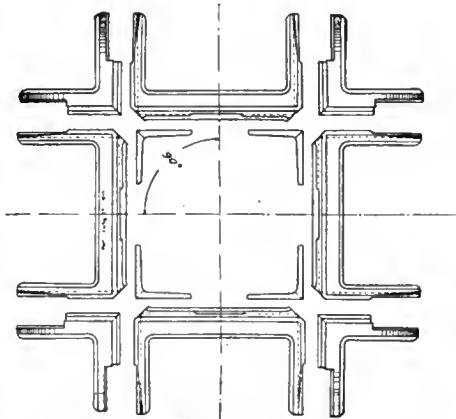
corrected by placing scientifically designed joints at the very places where breakage formerly occurred.

The lower first cost of a rolled rail crossing is therefore not a lower overall cost because it takes several rolled rail crossings to equal the life of one Balkwill Articulated Cast Manganese Crossing. Therefore the Balkwill Crossing is the cheapest in the long run. It gives

## MORE WEAR PER DOLLAR THAN ANY OTHER CROSSING YOU CAN BUY

It saves interruptions to traffic, makes less demand on labor, which is now so scarce, and also reduces the cost of making replacements frequently.

Write us for data on existing installations. If your special work manufacturer cannot get prompt deliveries of manganese castings or has not taken out a license to manufacture these crossings, **DON'T ACCEPT A SUBSTITUTE** but write us direct and we will see that your requirements are taken care of.



Joints at the flangeway intersections of Balkwill Articulated Cast Manganese Crossings positively eliminate breakage

**Order Balkwill Articulated Cast Manganese Crossings  
Direct from Your Special Work Manufacturers**

**The Balkwill Manganese Crossing Co.**  
506 Williamson Building, Cleveland, Ohio

# The More Extensive The Experience In Rail Grinding Methods

the more thorough and complete is the recognition of the economy,  
adaptability and practical value of the

## Reciprocating Track Grinder

Railway Track-Work Co.  
30th and Walnut St.  
Philadelphia, U.S.A.

Gentlemen:

I should be obliged if you would forward me particulars of your Reciprocating Track Grinder, as we are thinking of purchasing a machine of this nature. Our present grinder is one of the type manufactured by [REDACTED] but as it is not a reciprocating one, its field of usefulness is limited.

Our system is 550 Volt. D.C. and our gauge 135 centimeters.

Yours very truly,

[REDACTED]  
General Manager.

Fabrica de GAZ  
Fogões economicos por aluguel.  
Aquecedores para banheiros. —  
Lustres de gaz e luz electrica em  
combinação e ferros a gaz para  
engommar.

Abastecimento de AGUA  
— para agua quente, com  
— matrica que impede  
Aquecedores  
— dido.



— LARIA  
— de asfalto, piza  
refinada, carbofeno e oleos espe-  
ciais para a fabricação de desin-  
fectantes.

FORNECIMENTOS JHE.  
De aterro, pedra britada e saibro  
branco. Calçamentos a paraleli-  
pipedos a factors de passeios.

FUNDIÇÃO  
De ferro, metal e aluminium.

This interesting letter from a South American city suggests that the railway men of the world are learning as the American railway man has learned—by experience—that the Reciprocating Grinder does the work—does it right—does it economically. The identity of the writer and his company, as well as that of the grinder which he finds unsatisfactory, are not revealed for obvious reasons.

## Railway Track-work Company

30th and Walnut Streets, Philadelphia

AGENTS: Holden & White, Inc., 343 S. Dearborn St., Chicago

Wigmore, Hall & Co., Pacific Electric Bldg., Los Angeles, Cal.





## First Cost *and* Final Cost

Wooden ties, without any of the labor cost of laying, are cheaper, piece for piece, than Dayton Mechanical Ties—we freely admit that!

Untreated wooden ties **completely installed** with gravel ballast cost 6% more than Dayton Mechanical Ties for the same length of track.

Wooden ties, **at the end of ten years**, cost more than twice as much as Dayton Mechanical Ties.



### Furthermore:

D.M. Ties are permanent.

D.M. Ties outlast the pavement.

D.M. Ties are cushioned with an asphalt base, under the wooden rail support.

D.M. Ties are attached to the rails as shown in the picture on the left.

D.M. Ties form a rigid, reinforced concrete bed, each tie resting on its own highly resilient cushion.

Your inquiry for full particulars regarding Mechanical Railway Ties will be a step in the direction of better economy. Write today.



THE DAYTON MECHANICAL TIE CO.  
201 Third Street Arcade  
DAYTON, OHIO



## Collier Service Succeeds Through Specialization

If permanent success in car card advertising was just a matter of filling space with any old card, there would be no need for Collier Service.

But it isn't quite so simple, for the cards must be attractive enough to hold the attention and favorably impress the memory of the public.

Collier Service, for example, considers the making of a car card so important that it has separate specialists for lettering, for bust and figure drawing, for black and white, for broad poster effects, for still life drawing and so on.

Collier Service therefore results in car cards that are effective salesmen; and this in turn upholds the reputation of the street car as an advertising medium.

Are you using the service that insures uninterrupted revenue from car card advertising?

**Barron G. Collier**  
INCORPORATED

**Candler Building**

**220 West 42nd Street, New York City**

# Columbia Bulldozing



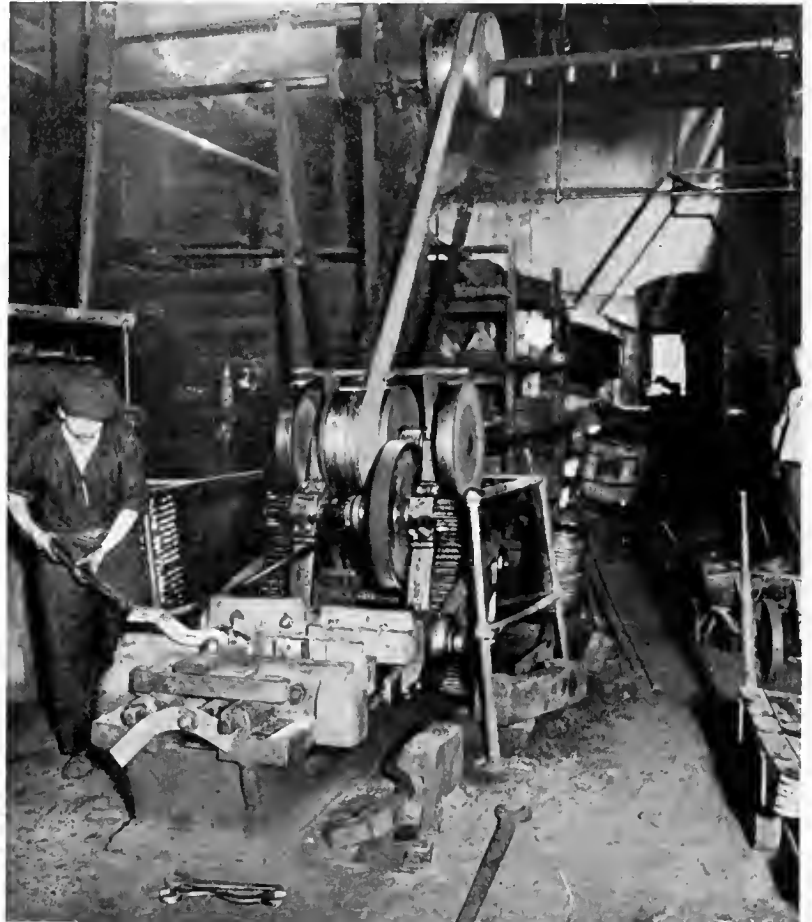
to Some  
Purpose!

**T**HERE are bulldozers and bulldozers. The kind shown deserves praise.

It's the machine we use for bending plates for brake lever jaws.

Like all the other Columbia tools, it's the best and most up-to-date for its work.

The large extent of Columbia business permits us to use highly specialized tools that are sure to do the work just as it ought to be done.



Bulldozer Bending Plates for Brake Lever Jaws.

And this specialization in workers and tools is true of every item in the Columbia output.

## Columbia Machine Works & Malleable Iron Co.

### TOOLS

Armature and Axle Straighteners  
Armature shaft straighteners  
Armature buggies and stands  
Babbling molds  
Banding and heading machines  
Car hoists  
Car replacers  
Coil taping machines for armature leads  
Coil winding machines  
Pinion pullers  
Pit jacks  
Signal or target switches  
Tension stands

Atlantic Ave. and Chestnut St.

Brooklyn, N. Y.

W. R. Kerschner Co., Inc., N. Y.  
Holden & White, Inc., Chicago  
F. F. Bodler, San Francisco  
Railway & Power Eng. Corp., Ltd., Toronto, Can.



### CAR EQUIPMENT

Armature and axle bearings  
Armature and field coils  
Bearings (axle and armature)  
Brush-holders and brush-holder springs  
Brake, door and other handles.  
Brake forgings, riggings, etc.  
Car trimmings  
Commutators  
Controller handles  
Forgings of all kinds  
Gear cases (steel or malleable iron).  
Grid resistors  
Third-rail shoe beams and accessories  
Trolley poles (steel) and wheels



## About Getting Your Bearings

That means—know where you're heading for.

What's your use factor of cars? Equipment failures cost you far more in idle platform time than the actual expense of making repairs.

Get lined up on

# MORE-JONES "TIGER" BRONZE AXLE AND ARMATURE BEARINGS

and you'll have one service problem less to contend with.

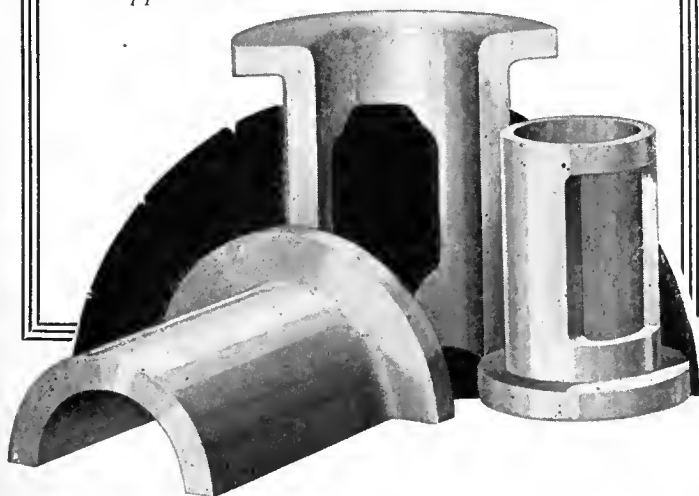
All that the best material, expert foundry practice and careful laboratory research and control can do to insure long, dependable service are to be found in More-Jones "Tiger" Bronze Axle and Armature Bearings.

Others have proved it. They re-order regularly. We'll guarantee you the same experience.

**More-Jones  
Brass & Metal Company**

St. Louis, U. S. A.

*Further information  
and prices  
on application.*



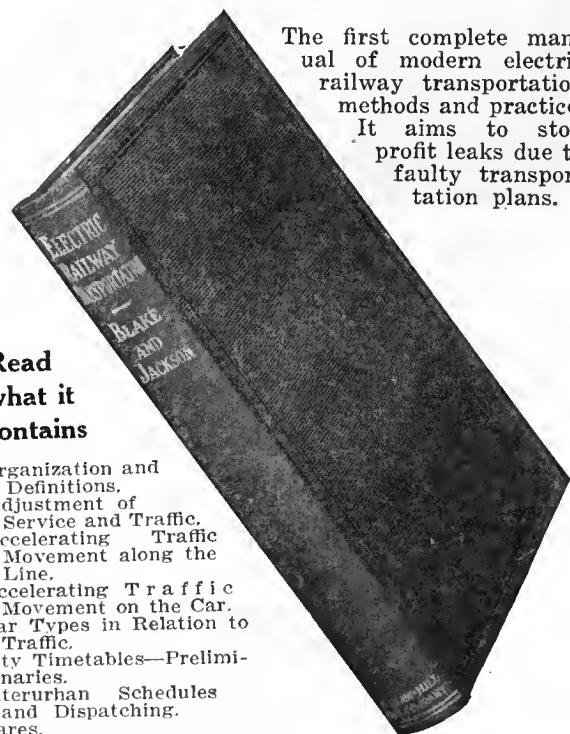
## Carry Freight

Go into the new field for street railways—freight and express business. A great many companies are turning to this profitable traffic.

You can find out how the scheme works, what the requirements are, how to introduce the system, and where it is most successful by reading pages 355-374 of

## Blake and Jackson's Electric Railway Transportation

487 pages, 6 x 9, illustrated. \$5.00 net, postpaid



The first complete manual of modern electric railway transportation methods and practice. It aims to stop profit leaks due to faulty transportation plans.

### Read what it contains

Organization and Definitions.  
Adjustment of Service and Traffic.  
Accelerating Traffic Movement along the Line.  
Accelerating Traffic Movement on the Car.  
Car Types in Relation to Traffic.  
City Timetables—Preliminaries.  
Interurban Schedules and Dispatching.  
Fares.  
Fare Collection Practices and Devices.  
Public Relations.  
Promotion of Passenger Traffic.  
Traffic Signs for Cars, Station and Road—Information for the Public.  
Competition.

Freight and Express Business.  
Selection and Training of Men.  
Wages and Wage Agreements.  
Welfare Work.  
Discipline of Trainmen.  
Forms of Extra Pay.

**It will pay you to examine this book. Send no money—just the coupon.**

This is a book of such definite value that you will refer to it constantly. It is a book you cannot afford not to read. Examine it for ten days free. No agents—no follow-up.

## FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc.,  
239 West 39th St., New York, N. Y.

You may send me on 10 days' approval:

**Blake and Jackson—Electric Railway Transportation, \$5.00 net.**

I agree to pay for the book or return it postpaid within 10 days of receipt.

...I am a regular subscriber to the Electric Railway Journal.

...I am a member of A. I. E. E. or A. E. R. A.

(Signed) .....

(Address) .....

Reference ..... (E-3-23-18)

(Not required of subscribers to the Electric Railway Journal or members of A. I. E. E. or A. E. R. A. Books sent on approval to retail customers in U. S. and Canada only.)



The new high speed interurban cars recently placed in service by the Jamestown, Westfield & Northwestern Railroad are fitted with Standard No. 1062 rolled steel wheels mounted on Standard axles.

—Representative practice



## STANDARD STEEL WORKS CO.

Morris Building, Philadelphia

New York  
Chicago  
St. Louis  
Pittsburgh  
San Francisco  
Richmond

Portland  
Havana, Cuba  
London, Eng.  
Melbourne, Aust.  
Monterey, Mex.  
Mexico City



# **EMB** Grid Resistors

## ARE MADE RIGHT AND STAY RIGHT

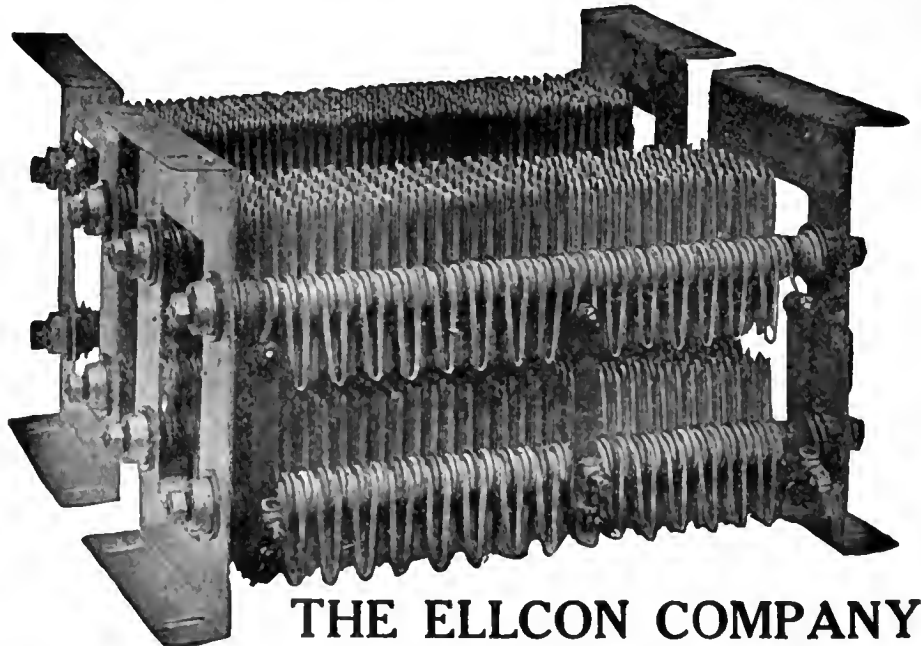
No resistors get more abuse than those under a car.

They are abused electrically by careless operation of the controller.

They are abused mechanically by exposure to dusty, muddy and stone-littered streets.

Until the arrival of E M B drawn, non-corroding grid resistors, troubles from these sources seemed unavoidable.

E M B grid resistors actually have made this part of your equipment troubleproof.



## THE ELLCON COMPANY

50 Church Street, New York



## You Are Never in Doubt

when your road is protected by

## Nachod Signals

No matter what your road conditions are, a Nachod will take care of them. There are 7 types of Nachods for all service, from high speed interurban to city travel.

Write for information.

*Nachod Spells Safety.*

**NACHOD SIGNAL CO., Inc.**

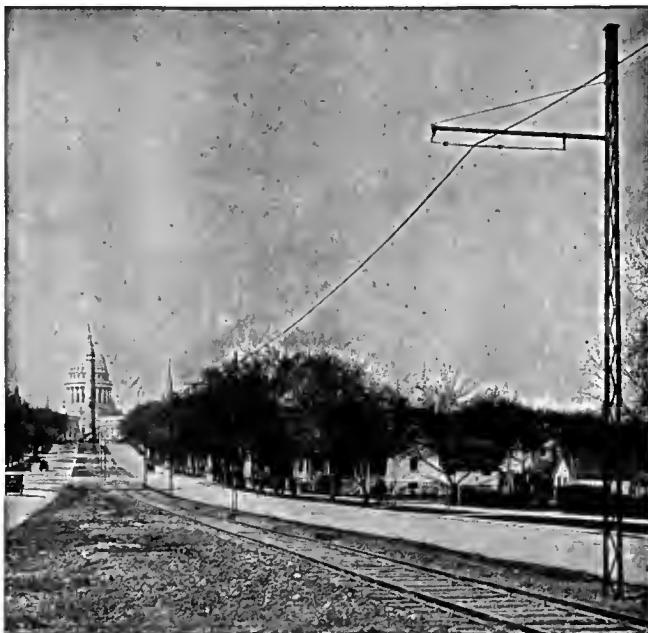
Louisville, Ky.

PACIFIC COAST REPRESENTATIVES

BOYLES & SMITH CO., Portland, Oregon, San Francisco, Cal.,  
Los Angeles, Cal.

2224

## STEEL POLES For Every Pole Purpose



Bates Steel Poles Ornamenting the Approach to the New Wisconsin State Capitol Building, Madison, Wis.

Strongest STEEL POLE of like weight in the world.  
Best STEEL POLE in the world for electric railway trolley service, Power Transmission or Street Lighting.  
Most artistic STEEL POLE in the world for any service.  
We make the lowest prices.

We have constantly on hand about two thousand tons of steel and can make immediate shipments.  
A full line of convenient malleable fittings.

Our steel pole TREATISE tells a big story. Ask for it.

**BATES EXPANDED STEEL TRUSS CO.**

208 South La Salle St., Chicago, Ill., U. S. A.

## SPECIAL TRACK WORK

Built to withstand  
severe service



SWITCHES  
FROGS  
CROSSINGS  
and  
COMPLETE  
LAYOUTS

**New York Switch & Crossing Co.**  
Hoboken, New Jersey

## ALUMINUM COMPANY OF AMERICA PITTSBURGH, PA.

Manufacturers of Aluminum, Ingot, Sheet,  
Tubing, Wire, Rod, Rivets, Moulding,  
Extruded Shapes, Electrical Conductors

General Sales Office, 2400 Oliver Building, Pittsburgh Pa.

### BRANCH OFFICES

Boston.....131 State Street  
Chicago.....1500 Westminister Building  
Cleveland.....950 Leader-News Building  
Detroit.....1512 Ford Building  
Kansas City.....308 R. A. Long Building  
New York.....120 Broadway  
Philadelphia.....1216-1218 Widener Building  
Rochester.....1112 Granite Building  
San Francisco.....781 Rialto Building  
Washington.....509 Metropolitan Bank Building

CANADA—Northern Aluminum Co., Ltd., Toronto

LATIN AMERICA—Aluminum Co. of South America, Pittsburgh, Pa.

ENGLAND—Northern Aluminium Co., Ltd., London

Send inquiries regarding aluminum in any form to nearest Branch Office, or to General Sales Office.

## HIGHEST QUALITY

TRACK SPECIAL WORK



**WE MAKE THIS GRADE ONLY**

**CLEVELAND FROG & CROSSING CO.**

CLEVELAND OHIO

## BARBOUR-STOCKWELL CO.

205 Broadway, Cambridgeport, Mass.

Established 1858

Manufacturers of

**Special Work for Street Railways**

Frogs, Crossings, Switches and Mates

Turnouts and Cross Connections

Kerwin Portable Crossovers

Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

# THE LINDSLEY BROTHERS CO.

## Western "Good Poles Quick" Northern

Quick Shipments  
from our  
Minneapolis Yard

Rooms 832-834, 72 West Adams St., Chicago, Ill.  
Spokane - St. Louis

Butt Treating  
Open Tank and  
"Hot and Cold" Processes

## POLES WESTERN CEDAR PILING

We brag about the SERVICE we give

B. J. CARNEY & CO.

E. B. BRANDE, Manager M. P. FLANNERY, Manager  
819 Broad Street, Grinnell, Ia. Spokane, Wash.  
WM. MULLER & CO., 1729 McCormick Bldg., Chicago.  
Commit us to memory.



## EUREKA PRODUCTS

Commutators, Trolley Wheels, Sleet Trolley Wheels,  
Trolley Ears, Line Material, Controller Fingers, Brush  
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We make quality goods.

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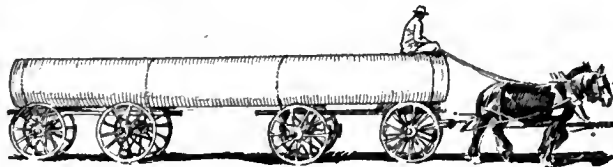
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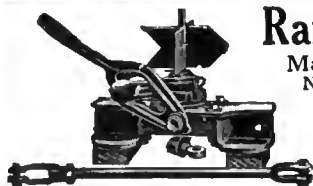
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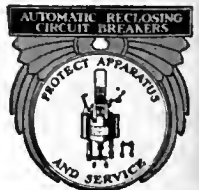
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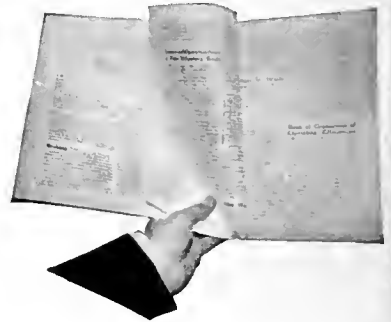


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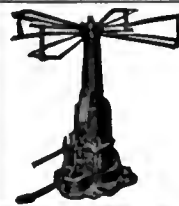
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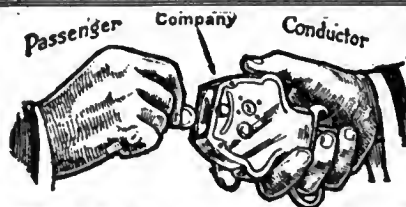
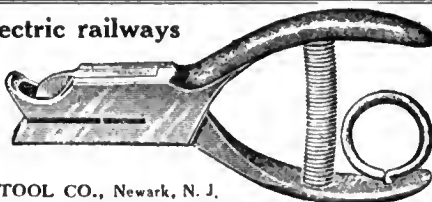
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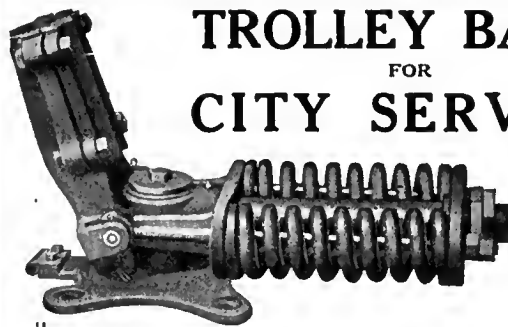
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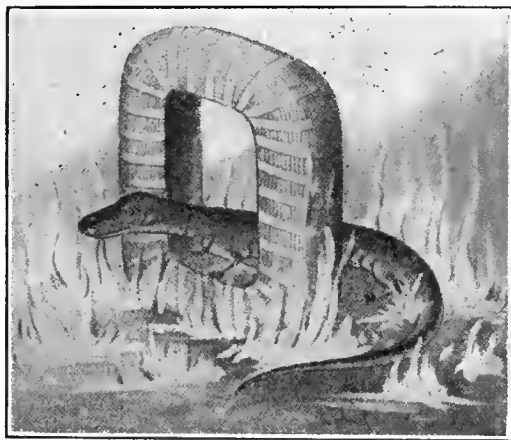
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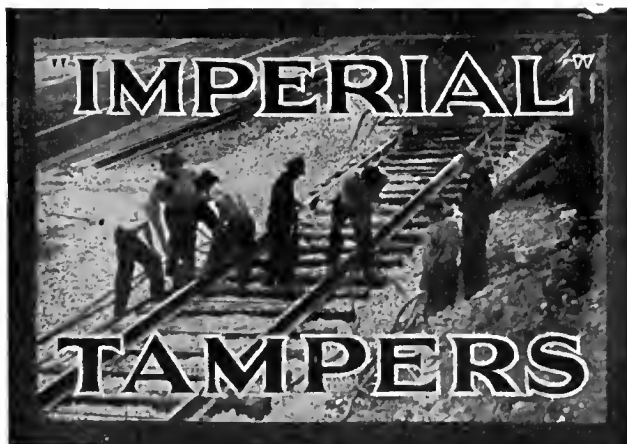


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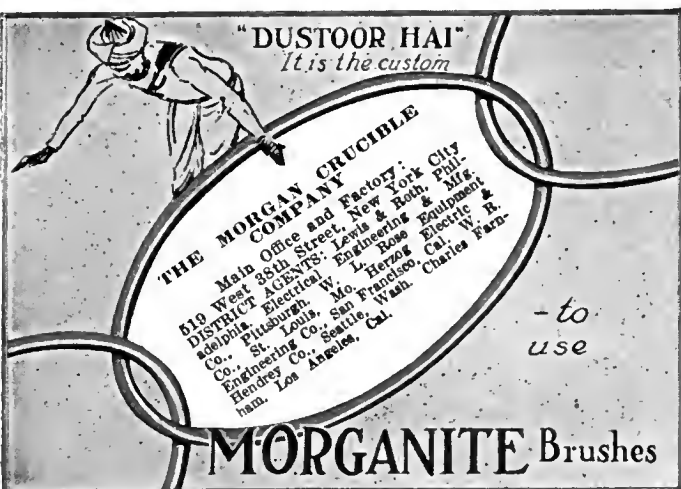
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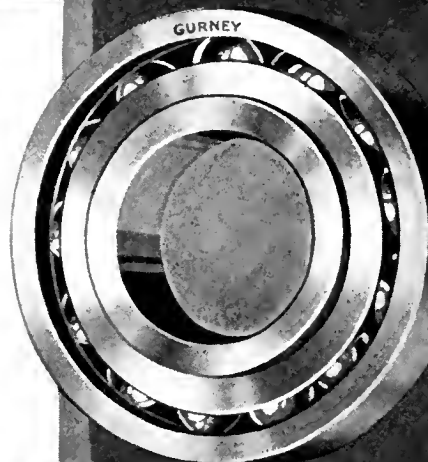
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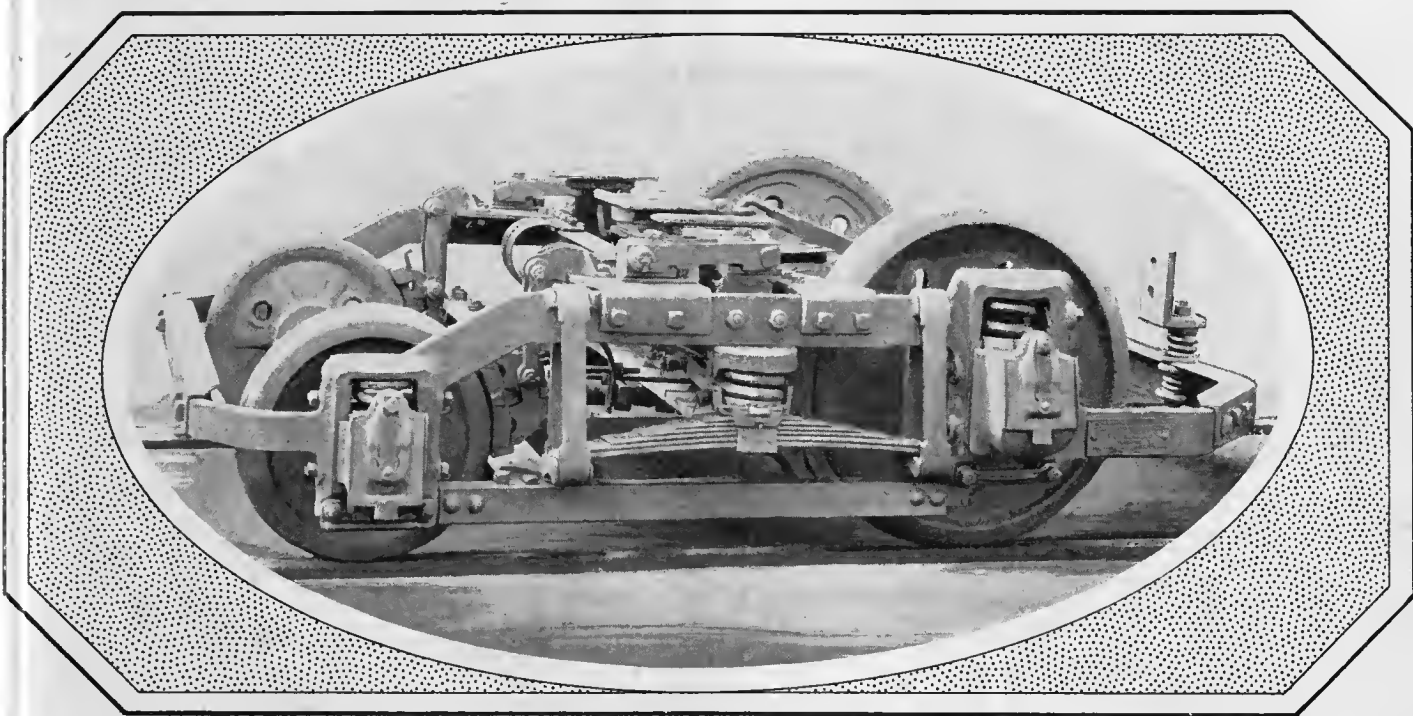
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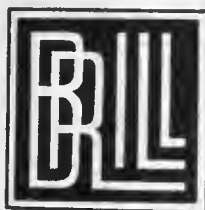


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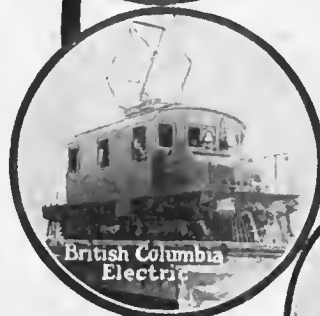
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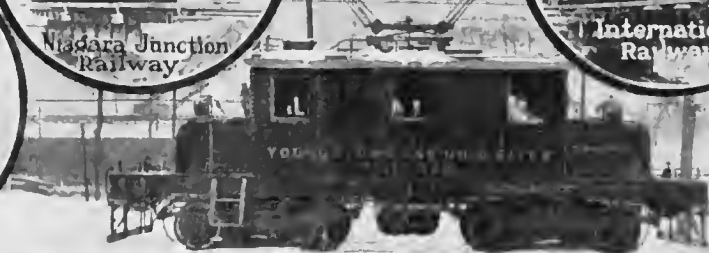
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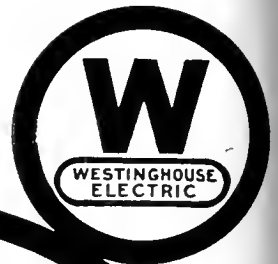
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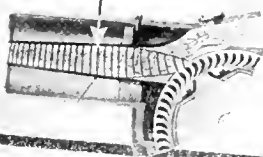
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## Small Gummed Stickers of This Third Liberty Loan Poster to Tab on Your Letters—

During the month of April every letter mailed by the McGraw-Hill Company, Inc., will carry on its face a small sticker or gummed label; an exact miniature reproduction of this poster, faithfully duplicated in four colors and having all the force of the original, only on a smaller and more compact scale.

Of necessity we have ordered a very large quantity of these stickers—more than enough for our own needs—and hence we have a certain reserve stock upon which you are at liberty to draw, should you desire a supply to use in connection with your own correspondence.

We will furnish you with these labels at the following price:



Exact Size of Label

### \$3.00 per 1000

If the opportunity appeals to you, figure out how many you need and let us know your requirements so that we can supply you promptly.

The Third Liberty Loan needs backing; both financial and moral. There's a need for **everybody** on the rope; and this Company is glad to be able to share with you a plan to help advertise this third call by making every letter you send out a reminder to fall in line.

When sending in your order please address—

**LIBERTY LOAN DEP'T.**  
**McGraw-Hill Company, Inc.**  
36th St. at 10th Ave., New York City



# PRODUCTS



O-B Stud Terminal Bond  
(Patented)



O-B Gas Weld Bond  
(Patented)

## Neglected Bonding is Not Economy

If your repair shops are crowded with cars—*look to your bonding.* Poor bonding causes most burnt-out armatures.

If your schedules are not maintained—*look to your bonding.* Poor bonding reduces the capacity of equipment.

If your coal pile is dwindling too rapidly—*look to your bonding.* Poor bonding wastes power.

If your headlights and car lights are dim—*look to your bonding.* Poor bonding means inadequate lighting.

Now is the time to get the benefits and profits from good bonding.

O-B Bonds are good bonds and they are proving it every day on scores of properties.

*Prompt Shipment.*

**The Ohio Brass Company, Mansfield, Ohio**

New York Philadelphia Pittsburgh Chicago Los Angeles San Francisco

# It Stays in the Wood Forever

## R. W. P. O.

### Reilly's Wood Preservative Oil—

—the best preservative oil for the open tank or brush treatment of any kind of timber.

It is a pure coal tar product that penetrates thoroughly and, what is more—it *stays* in the wood.

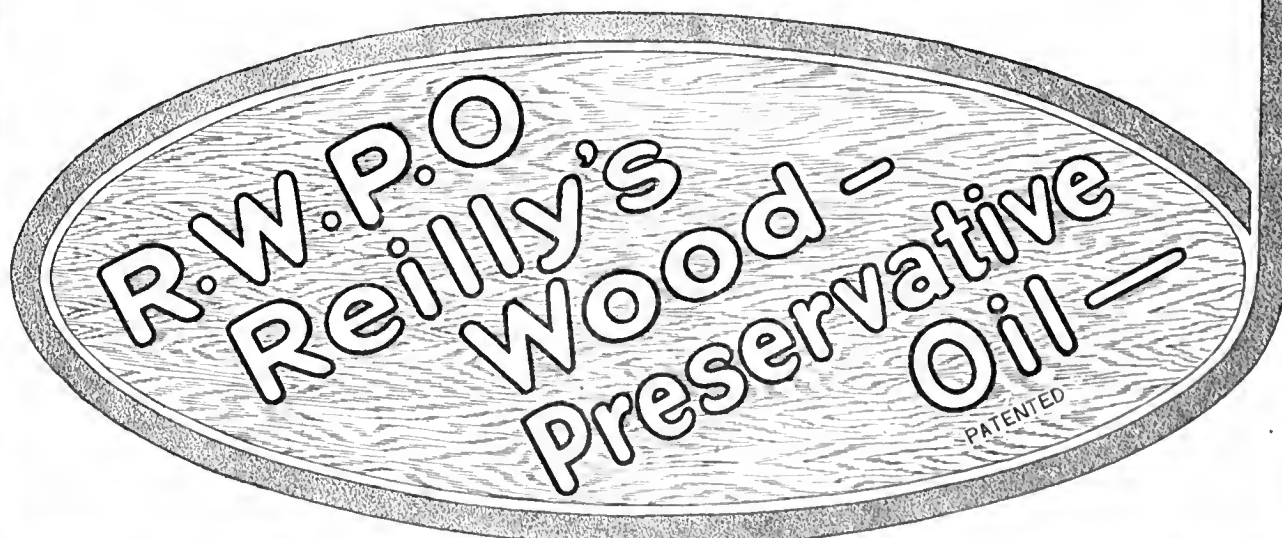
Its exceptionally high boiling point gives it a permanency that means efficiency and economy.

R. W. P. O. coats the surface, fills cells and fibres with a solid mass of insoluble oil that prevents the entrance of water and protects the timber against germ attack.

It is limpid and free-flowing at working temperatures.

**Republic Creosoting Company**  
Indianapolis, Ind.

Plants:      Indianapolis      Minneapolis      Seattle      Mobile



# ***Illuminated Signs, "Golden Glow" Headlights and "Safety" Fixtures are essential to real money-making service***



Car of the Lehigh Valley Transit Co., Allentown, Pa., Keystone Equipped

Half-way methods of car illumination are not in keeping with the times. Your patrons do not find pleasure in riding in dull, dingy cars. It is not in line with good service to have a patron in doubt as to the destination of the car because he cannot see the car sign. And no one realizes the safety value of efficient headlights better than your riding public.

Surely, now is the time to make your patrons contented with the service you offer.

There is no better way than to equip your cars with—

**Illuminated Car Destination Signs**  
**"Golden Glow" Headlights (Crystal Mirror Type)**  
**"Safety" Car Lighting Fixtures**

*Write for catalogs.*

## **ELECTRIC SERVICE SUPPLIES CO.**

*Manufacturer of Railway Material and Electrical Supplies*

PHILADELPHIA  
 17th and Cambria Sts.

NEW YORK  
 50 Church St.

CHICAGO  
 Monadnock Bldg.

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg



# 4 Repeat Orders for THERMIT WELDS

## On the Third Avenue Railway System, New York



Third Avenue between 56th and 59th Streets, New York

### Order No. 1—In New Rails

The first order for Thermit Welds dates back to 1914. It consisted of 50 welds in new 7-inch rails, LS section 104-429—and was installed by our own men on Third Ave. between 56th and 59th Streets.

One-half of these welds were made with inserts and the other half without inserts. The latter type of joint was developed by E. M. T. Ryder, Engineer of Maintenance of Way, of the Third Avenue Railway System.

In spite of the heavy traffic during four years of continuous service no breaks have occurred in any of the fifty Thermit Welds.

Thermit Welds insure a smooth and perfectly continuous track with joints that stay smooth during the life of the rail. That means no pounding, less upkeep and more comfort to your passengers.

Write us for full details concerning Thermit Welds applied to your track.



### METAL & THERMIT CORPORATION

Successors to Goldschmidt Detinning Co. and the Goldschmidt Thermit Co.  
120 BROADWAY, NEW YORK

329-333 Folsom St., San Francisco  
7300 So. Chicago Ave., Chicago  
Factories located at Chrome, N. Y.; Wyandotte, Mich.; East Chicago, Ind.; Jersey City, N. J.

103 Richmond St., W., Toronto, Ont.  
1427-1429 Western Ave., Pittsburgh, Pa.





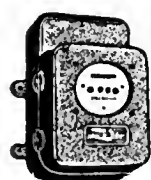
## Just Issued and Worth Reading

Illustration shows a few representative pages from our new booklet (Bulletin 50). Don't fail to read this treatise. You will be amply repaid by the information it contains. It's short and right to the point.

It sets forth the fundamentals of energy saving through metering the energy used. It goes right to the root of the problem, attacking it with a logical clearness and conciseness that is easily understood, and will be readily appreciated.

It shows the advantages of proper acceleration, coasting, braking, etc., and points out how substantial savings in power may be effected by use of the ECONOMY METER—The "Watchdog of Your Power."

This booklet will be sent, on request, to any one desiring it. Ask for Bulletin 50.



# ECONOMY

**ECONOMY ELECTRIC DEVICES CO.**

EXCLUSIVE SALES AGENT

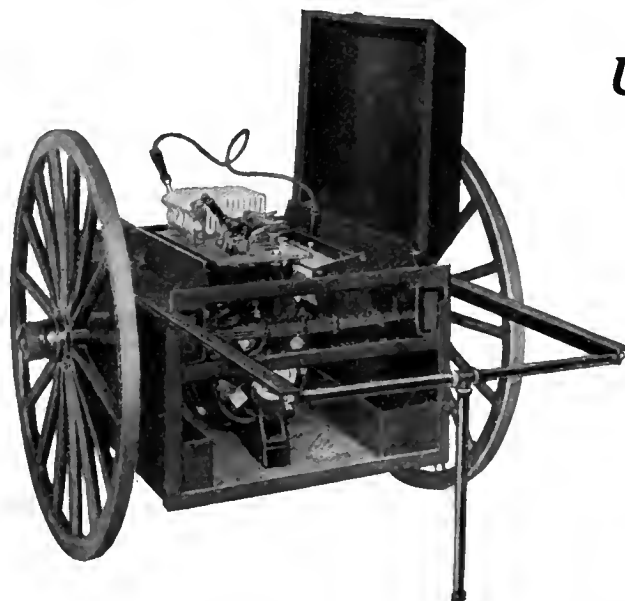
Sangamo Economy Railway Meter  
OLD COLONY BLDG. CHICAGO



# Are You Acquainted With the SAVINGS in Arc Welding

being  
obtained  
with

Universal  
Welding  
Equipments



?

?

**Joint Welding** Joints are being installed with less than 7 K.W. per joint at a rate of  $2\frac{1}{2}$  joints per hour under 3 minute traffic head-way with 3 men.

**Copper Bonds** can be welded with  $\frac{1}{4}$  K.W. per bond in 45 seconds. One hundred bonds can be installed per day.

**Cupped Rails** are being welded with less than  $\frac{1}{10}$  the current consumed by resistance welders and the work done just as rapidly.

**Shop Repairs** All kinds of shop repairs can be made, including carbon arc work needing heavy current in minimum time and less current than any other type of machine.

These economies can be had with the one outfit and are made possible by the convenience of transportation, adaptability to the various kinds of work demanded and the high electrical efficiency of the dynamotors.

*Write us or our nearest agent and let us tell you  
more about these equipments.*



Trade Mark

## ATLANTIC WELDING COMPANY

30 CHURCH STREET NEW YORK



Trade Mark

CHAS. N. WOOD CO.  
14 Federal Street, Boston, Mass.  
RAILWAY TRACK-WORK CO.  
30th and Walnut Sts., Phila., Pa.

AGENTS  
The ELEC. ENGINEERING & MFG. CO.  
First Nat. Bank Bldg., Pittsburgh, Pa.  
HOLDEN & WHITE, Inc.  
343 S. Dearborn St., Chicago, Ill.

WIGMORE HALL & CO.  
Pacific Elec. Bldg., Los Angeles, Cal.  
W. C. BURDICK  
508 First Nat. Bank Bldg.,  
Milwaukee, Wis.

Canadian Representatives: LYMAN TUBE & SUPPLY CO., Ltd.,  
Montreal Toronto Winnipeg



**W**HERE the wheel loads are heavy and the speeds high; where the wheel service is most severe; there you will find the Davis One-Wear Manganese Steel Wheel making records for high mileage capacity and low maintenance costs.

American Steel Foundries  
1100 McCormick Bldg. CHICAGO

# DAVIS STEEL WHEELS



## *Where Voltage is Low*

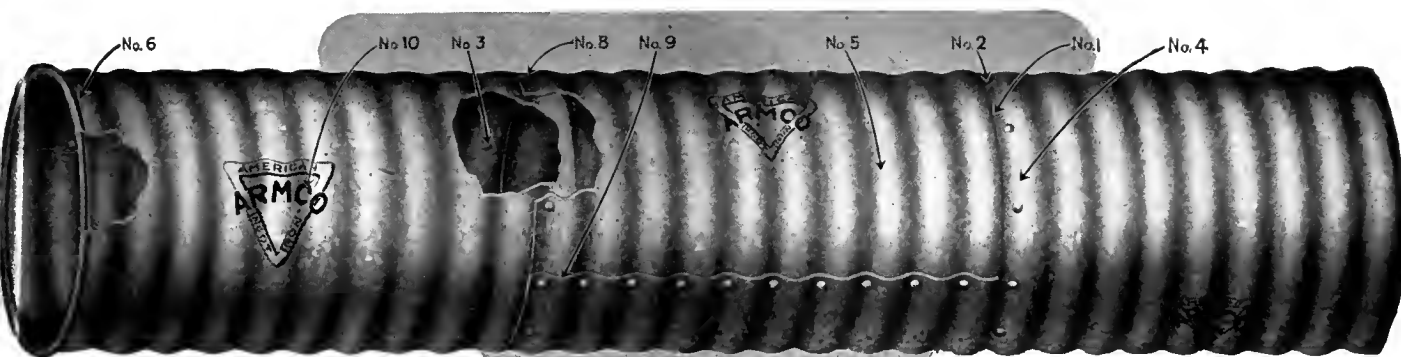
as, for instance, at the end of the line, the Erico Portable Welder shows its great flexibility and usefulness as clearly and undeniably as anywhere else along the track.

Switches are so arranged that the outfit will weld rail bonds on voltages from 250 to 750.

Full information on request.

**The Electric Railway Improvement Co.**  
Cleveland, Ohio





# TEN REASONS WHY "ARMCO" IRON CULVERTS

**1** **Solid Construction.** In the manufacture of "Armco" Iron Culverts the seams are *tightly* and *evenly* cinched. Before riveting sufficient power is applied to secure the ideal of closeness in each and every joint.

**2** **Rivets are ample in size and number.** They are closely spaced and properly driven. They are made from the same metal as the pipe. Compare the riveting of "Armco" Iron pipe with that of ordinary material.

**3** **The rivets are always properly upset—never** crushed between the plates. The inside of the pipe as well as the outside will bear the closest inspection.

**4** **The pipe is straight and even.** The joints are not to be loosened by bending or swaying. Try the experiment of lifting one end of a sixteen or eighteen foot "ARMCO" Iron Culvert of small diameter and *jouncing* it up and down as hard as you can. You cannot loosen the joints or damage the pipe. This is one good test for corrugated pipe in general.

**5** **"ARMCO" Iron Culverts carry the maximum** quantity and quality of galvanizing. This material has a great superiority over substitute metals in its ability to take a heavy coating of pure zinc, *and retain it under forming operations.* "ARMCO" Iron Culverts meet the United States Government specifications of two ounces of galvanizing to the square foot.

**6** **Protection for the Culverts in shipping and installing and after they are placed in service** is secured by the rodded end. A heavy rod is rolled into the end sections. It gives ample reinforcement exactly where it is needed, and entirely does away with battered and bruised ends and the danger to stock from the exposed edges of unprotected corrugated pipe. This development also results in giving the culvert a finished and handsome appearance.

**7** **Strong, convenient and lasting coupling devices** are provided where it is necessary to ship the pipe in more than one section to be joined in the field. This is an element not to be despised when considering long service under varied conditions.

**8** **Toughness and resiliency** are qualities of thoroughly well made corrugated pipe. "Armco" Iron Culverts are capable of withstanding conditions caused by freezing and thawing or by settling and shifting foundations which are speedily fatal to many otherwise excellent constructions.

**9** **Plates and rivets are always of gages and dimensions specified.** There is no skimping of metal. The Culverts are always of full gage *all the way through and not merely at the end sections.* The size of the pipe is that of the *net internal diameter*, and the length is that stated on the invoice. Put them on the scales and see whether they weigh what they should. That is a quicker and surer method than gaging, and is readily applicable to any culvert. *See that you get what you pay for.*

**10** **Their material is "ARMCO" (American Ingot) Iron—the purest, most even and most durable** of all metals available for culvert use. The "Armco" Triangle Brand is everywhere a guarantee of quality. On corrugated culverts it indicates the recognized standard as to material and construction.

*For full information on Rust-Resisting "Armco" Iron Culverts, Flumes, Siphons, Sheets, Roofing and formed Products, write the nearest manufacturer.*

Arkansas, Little Rock—Dixie Culvert & Metal Co.  
California, Los Angeles—California Cor. Culvert Company  
California, West Berkeley—California Corrugated Culvert Company  
Colorado, Denver—R. Hardesty Mfg. Co.  
Delaware, Clayton—Delaware Metal Culvert Co.  
Florida, Jacksonville—Dixie Culvert & Metal Co.  
Georgia, Atlanta, Dixie Culvert & Metal Co.  
Illinois, Springfield—Illinois Corrugated Metal Co.  
Indiana, Crawfordsville—W. Q. O'Neill Co.  
Iowa, Des Moines—Iowa Pure Iron Culvert Co.  
Iowa, Independence—Independence Cor. Culvert Co.  
Kansas, Topeka—The Road Supply & Metal Co.  
Kentucky, Louisville—Kentucky Culvert Co.  
Louisiana, New Orleans—Dixie Culvert & Metal Co.  
Maryland, Baltimore—Wm. M. Baker, Munsey Building

Massachusetts, Palmer—New England Metal Culvert Company  
Michigan, Bark River—Bark River Bridge & Culvert Company  
Michigan, Lansing—Michigan Bridge & Pipe Co.  
Minnesota, Minneapolis—Lyle Corrugated Culvert Company  
Minnesota, Lyle—Lyle Corrugated Culvert Co.  
Missouri, Moberly—Corrugated Culvert Co.  
Montana, Missoula—Montana Culvert & Flume Co.  
Nebraska, Lincoln—Lee Arnett Co.  
Nebraska, Wehno—Nebraska Culvert & Mfg. Co.  
Nevada, Reno—Nevada Metal Mfg. Co.  
New Hampshire, Nashua—North-East Metal Culvert Company  
New Jersey, Flemington—Pennsylvania Metal Culvert Company  
New York, Auburn—Pennsylvania Metal Culvert Co.  
North Dakota, Wahpeton—Northwestern Sheet & Iron Works

Ohio, Middletown—American Rolling Mill Co.  
The Ohio Corrugated Culvert Co.  
Oklahoma, Shawnee—Dixie Culvert & Metal Co.  
Oregon, Portland—Coast Culvert & Flume Co.  
Pennsylvania, Warren—Pennsylvania Metal Culvert Company  
South Dakota, Sioux Falls—Sioux Falls Metal Culvert Company  
Tennessee, Nashville—Tennessee Metal Culvert Company  
Texas, Dallas—Wyatt Metal Works  
Texas, El Paso—Western Metal Mfg. Co.  
Texas, Houston—Lone Star Culvert Co.  
Utah, Woods Cross—Utah Corrugated Culvert & Flume Company  
Virginia, Roanoke—Virginia Metal & Culvert Co.  
Washington, Spokane—Spokane Corrugated Culvert & Flume Co.  
Wisconsin, Eau Claire—Bark River Bridge & Culvert Company

Canada: Canada Ingot Iron Co., Ltd., Guelph, Sherbrooke, Winnipeg, Calgary



*For High - Speed  
Interurban Service  
and Crowded City  
Streets*

## Providence Fenders and H-B Life Guards



are the most successful devices as yet designed for protection against accidents.

The installation of these automatic and absolutely dependable safety appli-

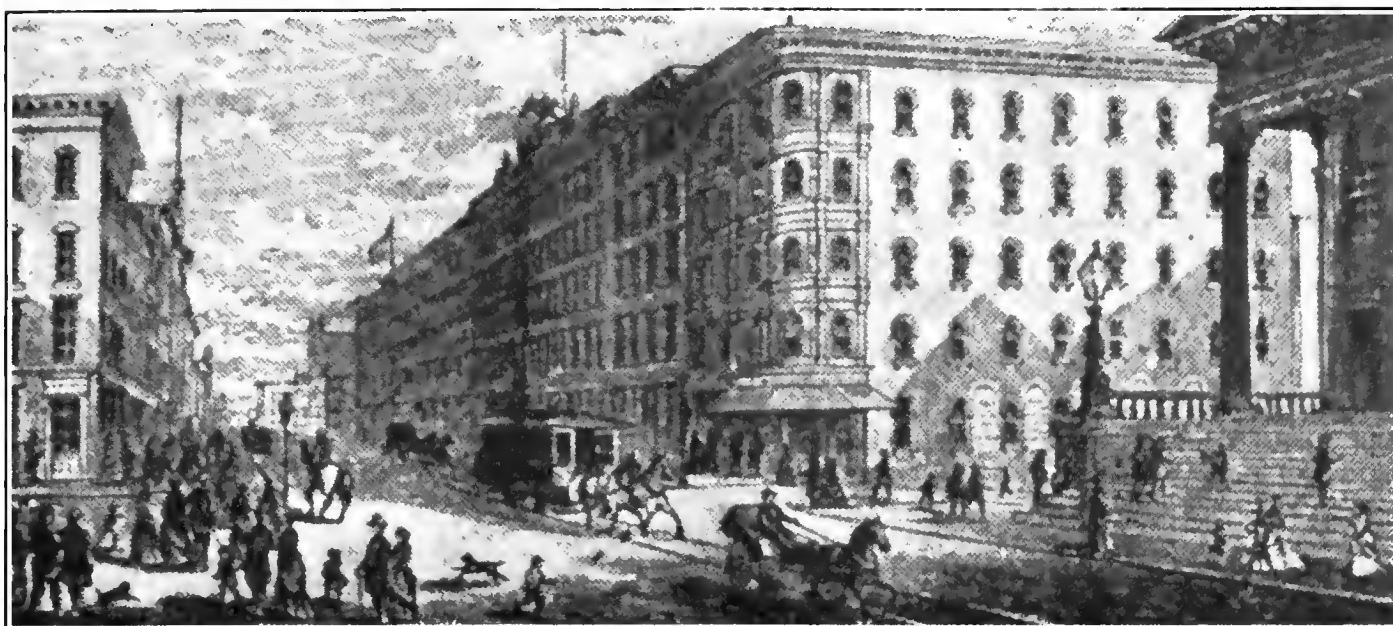
ances guarantees to the public at large your interest in their safety and goes far in establishing the goodwill towards your company which is so necessary to your successful operation.

*Let us send you detailed descriptions  
of their MECHANICAL construction.*

---

**The Consolidated Car Fender Co.**  
Providence, R. I.

General Sales Agent  
**Wendell & MacDuffie Co.**  
61 Broadway, N. Y.



The Street Railway Service of CINCINNATI, of which the then Mayor, Chas. F. Wiltach, said in 1868—"The city has been largely built up by their (the street railways') influence."

## What Street Railways Did for Cincinnati in 1868

they are still doing, and in larger measure, for that as well as for every other city and community which they serve today.

In his message covering the year 1868, quoted by us in our advertisement of February 23, the Mayor of Cincinnati attributed the rapid growth of Cincinnati in large part to the service of the street railways.

The vastly greater size of American cities of today, and the fact that street railway service

in them has been so long an established institution, may make the value of street railway service in a city's prosperity *less evident*, but that does not in the slightest alter the fact that this great value is still present.

Every electric railway in the country could secure effective publicity value from the use of this 50-year-old message of Mayor Wiltach.

Meanwhile, don't overlook the fact that

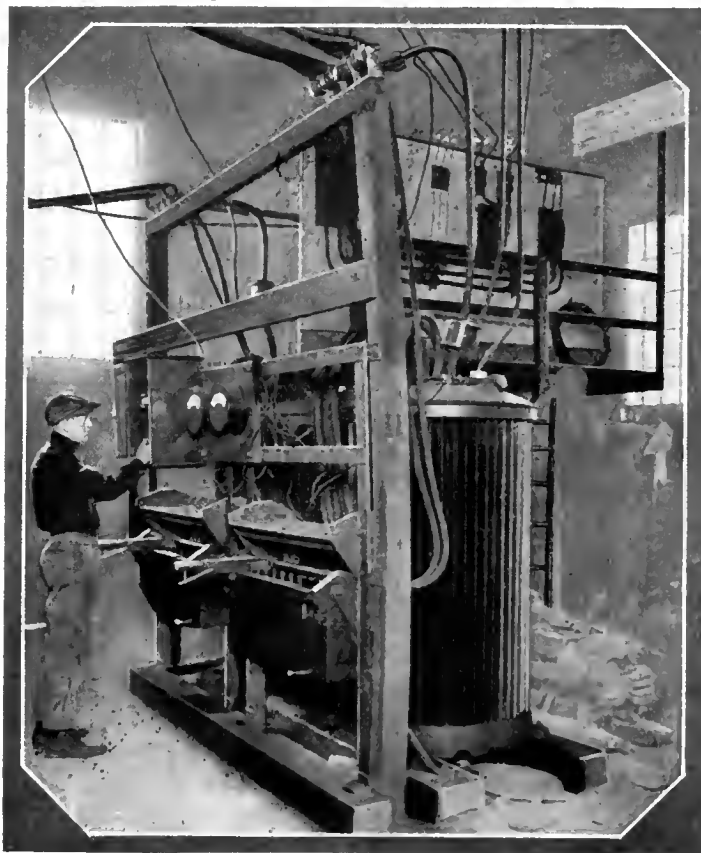
# Galena Oils

## AND GALENA SERVICE

have been relatively as valuable, economical and efficient for the railways as the railways have been for the public and that Galena value is just as great and important today as it has been at all times for the past half century.

# Galena-Signal Oil Co.

## Franklin, Pa.



The "brains" of the electric furnace where the electrical input is controlled—automatically insuring predetermined temperatures

# "Electroheat"

—means  
heat-treated  
Electrically

"ELECTROHEAT" is the mark of an achievement in axle making.

It stands for a process of electric furnace heat treatment that insures not only *better* axles, but manufacturing *uniformity* in production—a process applied and exclusively practised in axle making by Laclede Steel engineers.

The proper heat treatment of axle steel requires the even application of certain heats *uniformly* applied. Herein lies the superiority of the electric furnace over old-time "fuel" furnace processes. Its inherent operating characteristics and construction provide positive automatic temperature control, enabling

the entire operation of annealing or quenching and tempering of the steel forgings to be carried forward under perfect control and with absolute uniformity.

Service failures due to breakage, bending and excessive journal wear are thereby minimized because a steel structure possessing maximum strength and toughness is a scientific certainty.

That's why "Electroheat" Axles *have* to give better service. The process is *metallurgically* right!

NOTE.—"Electroheat" Armature Shafts possess the same torsional and shock-resisting qualities as "Electroheat" Axles, being heat treated by the same process. They minimize service breakdowns and maintenance costs.

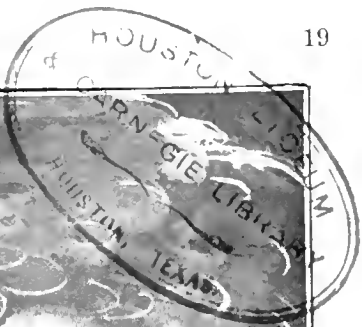


"If Heat-Treated Electrically—It's a VALSCO"

## LACLEDE STEEL COMPANY

General Offices—Federal Reserve Bank Building  
SAINT LOUIS, MO., U. S. A.





To Save the Lives of Our  
Brothers and Sons

Invest in U. S.

# Liberty Bonds

The supremely important business of America now is to win this war. This sixteen page pictorial message on that subject is made possible by the patriotic co-operation and support of the following firms:

American Brake Shoe & Foundry Co.	34
Bonham Recorder Co.	27
Brill Co., The J. G.	28
Griffin Wheel Co.	33
Hubbard & Co.	26
Ingersoll-Rand Co.	22
International Steel Tie Co.	23
National Brake Co.	24
National Pneumatic Co.	29
Norton Co.	22
Ohio Brass Co.	21
Railway Improvement Co.	32
S. K. F. Ball Bearing Co.	30
Tool Steel Gear & Pinion Co.	24
Wendell & MacDuffie Co.	20
Westinghouse Fraction Brake Company	31
McGraw-Hill Co., Inc.	19



# What Will Protect **YOU** *If These* Are Defeated?

Our army and navy are the protectors and the only protectors of *your* home—*your* family—*your* income—*your* property.

What will become of you and yours if these protectors are weakened and rendered insufficient to their task?

*They will not be defeated by the enemy.*

The only way they can be defeated or weakened is through *your* failure to support them with ships, food, weapons, ammunitions, clothing and supplies.

Your life, your business, the future of your family, may depend upon how much real effort and sacrifice you make to invest in

## Liberty Bonds

In utilizing this advertisement to talk Liberty Bonds rather than our own business, we do so in the firm belief that there will be little of either pleasure or profit in our business or any American business unless Liberty wins this war.

**Wendell & MacDuffie Co.**  
61 Broadway, New York

L.V. REAVIS

## How Much of Your Pay Do You Think You Can Keep if Germany Wins This War?

If, to help America win this war, you buy

# Liberty Bonds

to the very limit of your ability you are not merely helping America. You are not merely making a good investment. You are not merely helping to bring peace nearer. You are doing all these things, and in

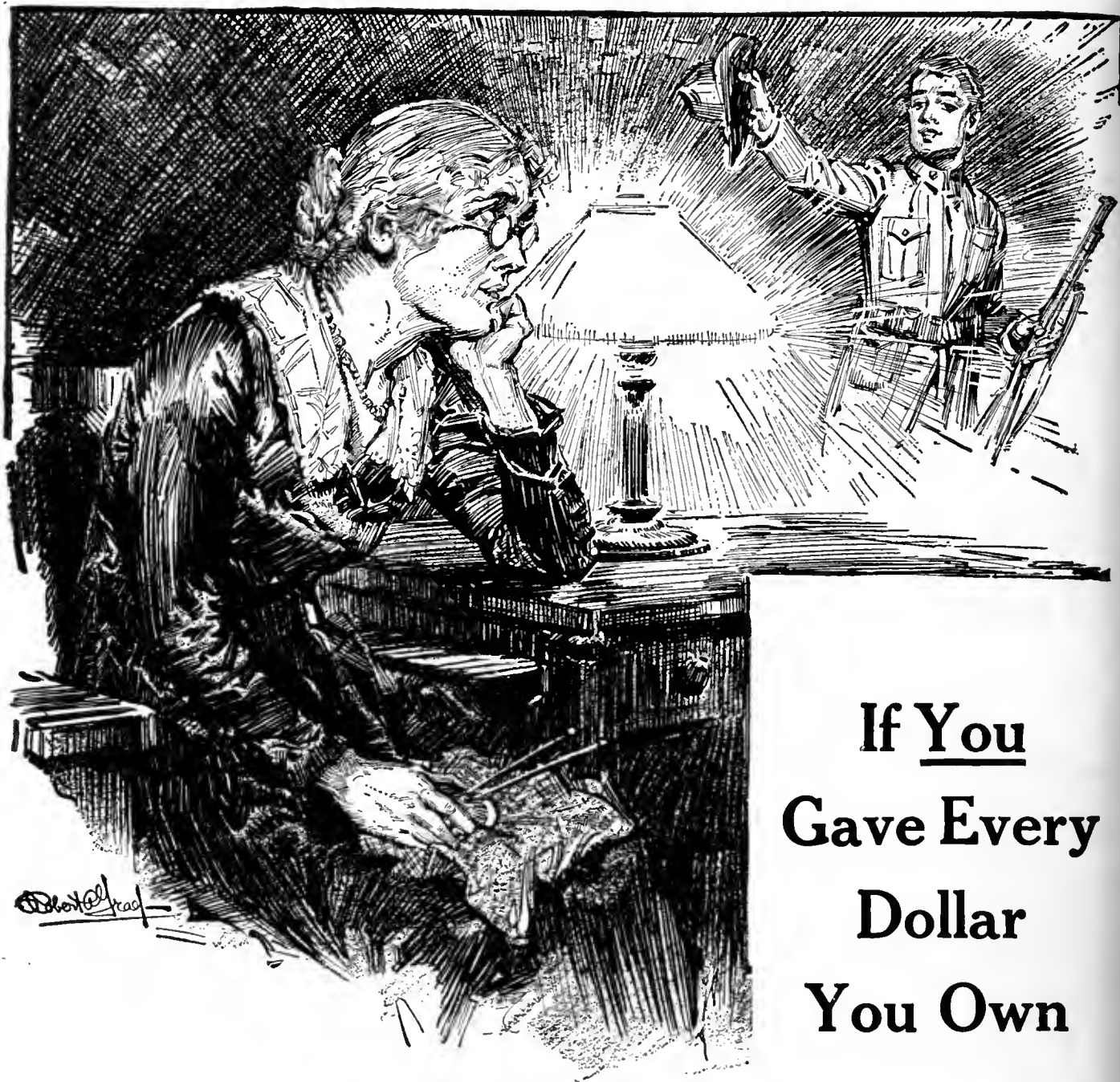
addition you are buying the best protection for your own individual prosperity—yes, the *only* real protection you can buy.



Universal Support of the Government is loyalty and patriotism and besides— if Uncle Sam is not victorious in this war there will be mighty little profit in business for U. S.—Autocracy is a close collector.

**The Ohio Brass Company**

Mansfield, Ohio



If You  
Gave Every  
Dollar  
You Own

how little would the sacrifice be compared to theirs.

We are not asked to give. We are asked only to *lend*. To lend at good interest secured by the best collateral on earth

# U. S. Liberty Bonds

In co-operation with the Liberty Loan Committee this advertisement is published by

**Norton Company**  
Worcester, Mass.

**Ingersoll-Rand Co.**  
11 Broadway, New York



**Will You Invest  
Your Money With  
Uncle Sam Now?**

**Or Let Germany  
Take It Away  
From You Later?**



Be practical. Look squarely at the facts. We will either invest our money with Uncle Sam now, at good interest rates, to help him win this war, or we will give it up later to pay Germany's war cost—and as much more as Germany chooses to collect. **Invest in**

**Liberty  
Bonds  
Today**

In co-operation with the Liberty Loan Committee  
this advertisement is published by

**The International Steel Tie  
Company  
Cleveland, Ohio**

# *The* **THIRD LINE** *of* **DEFENSE** *Get into it and Dig*



In this line every true American can  
and will help to win the war. Invest in

## **Liberty Bonds**

In co-operation with the Liberty Loan Committee this  
advertisement is published by

**The Tool Steel Gear & Pinion Co.**  
Cincinnati, Ohio





**Choose!**

"Lend Me Your Money  
that I may equip my Army  
and Navy to insure for you  
and your children the bles-  
sings of Liberty."

"Give Me Your  
Money or Your  
Life"

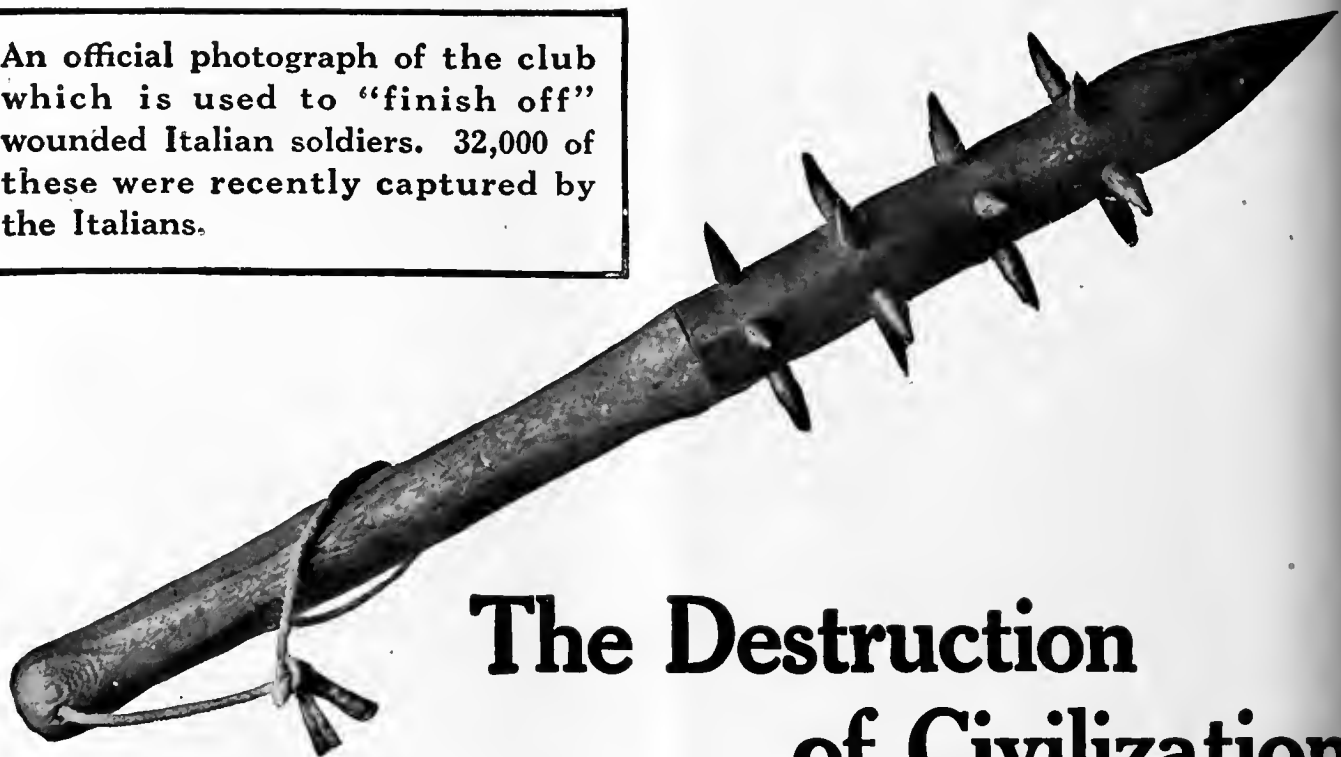
Invest now to the limit of your ability in

# U.S. Liberty Bonds

The Kaiser calls us "a nation of dollar chasers." Let us show him that we know how to use those dollars in the defense of Liberty and the overthrow of Prussianism.

**National Brake Co.**  
Buffalo, N. Y.

An official photograph of the club which is used to "finish off" wounded Italian soldiers. 32,000 of these were recently captured by the Italians.



## The Destruction of Civilization

is in grim and sober reality what we are fighting this war to prevent. The club pictured above—from an actual official photograph—might be the weapon of a savage cave man of five thousand years ago. It is in fact the weapon with which German soldiers "finish off" enemy wounded who have fallen on the battlefield.

There is only one answer to make to such methods—the defeat of the German armies. America has taken up the sword to give that answer. Our army is in France to help win this war on the battlefield—that civilization may be safe, that America may be safe.

### You Can Have Your Share in America's Answer to German Savagery

The Third Liberty Loan is your opportunity. It is the most direct blow that can be struck at German military supremacy. It is the most powerful aid that can be given our soldiers in France. It means rifles and helmets

and gas-masks—the best protection for our men from German brutality. It means big guns and shells and airplanes—and VICTORY.

Invest today in bonds of the Third Liberty Loan, and save the lives of American soldiers.

### Save Civilization, Save America, Your Own Family and Your Own Home

In co-operation with the Liberty Loan Committee this advertisement is published by

**Hubbard & Company**  
Pittsburgh, Pa.

# Where Your Money Goes



**W**E are now building more naval and merchant ships than we have constructed in the last generation.

We are building a vast fleet of airplanes, and enormous supplies of artillery, motor trucks, machine guns, rifles and ammunition. We are feeding, clothing and training an army of a million men, and preparing for a million more. We have loaned billions of dollars to our allies to be spent in the United States.

From the shipyards of the Pacific to those of the Atlantic; on our farms and in our mines, mills and factories in every state in the Union; back of the firing lines in France, where men are training, camps are being erected and railroads built, billions upon billions are being expended for labor, for transportation, for materials and supplies of every description.

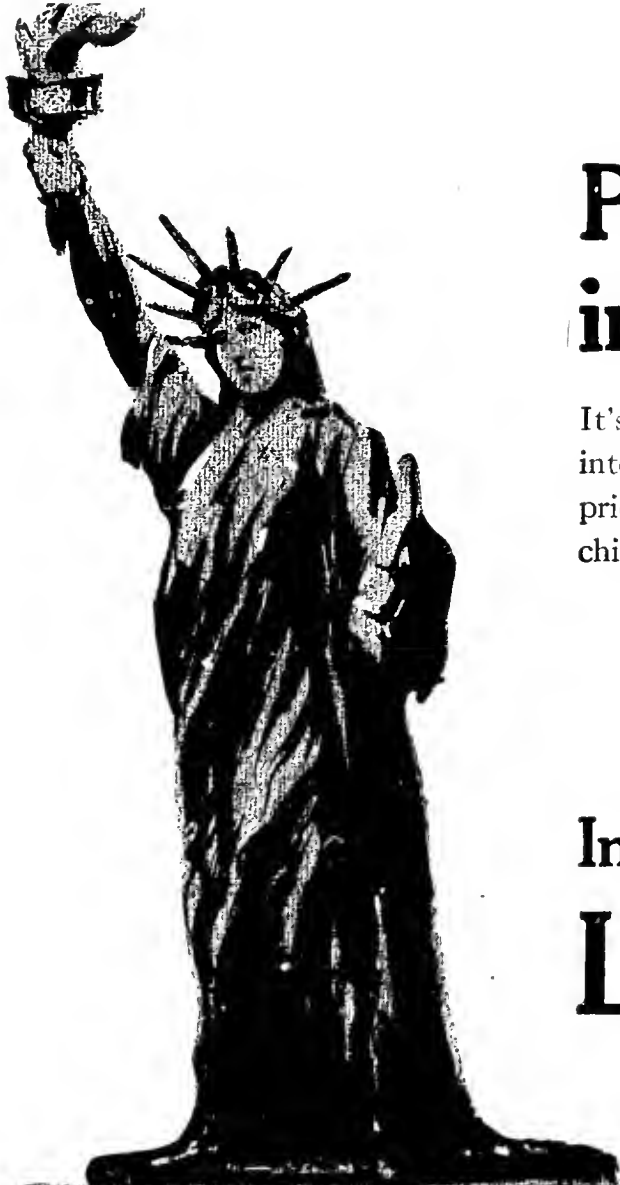
The mind can hardly conceive the sums of money required for our war preparations. Yet these expenditures are absolutely essential. We must win the war quickly if possible; we must carry it on for years if necessary. We must do the job with American thoroughness, let the cost be what it may.

Remember, when you invest in your Liberty Bonds, that there is immediate, urgent, imperative need for every dollar you can possibly spare.

In co-operation with the Liberty Loan Committee this advertisement is published by

**The Bonham Recorder Company**

Hamilton, Ohio



# Put your money in this bank

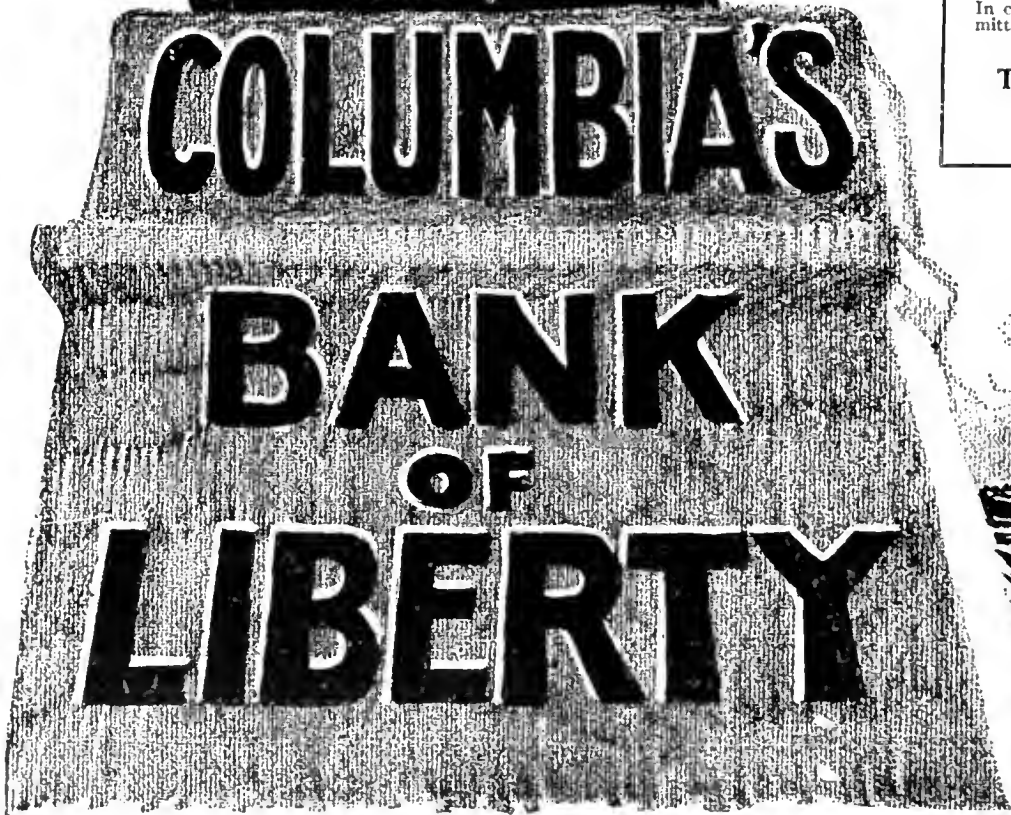
It's the safest in the world. It pays you good interest. And your deposits in it help to insure a priceless heritage of freedom and peace for your children and your childrens' children.

*To the limit of your  
resources*

## Invest in the Third U. S. Liberty Loan

In co-operation with the Liberty Loan Committee this advertisement is published by

**The J. G. Brill Company**  
Philadelphia, Pa.



**COLUMBIA'S  
BANK  
OF  
LIBERTY**





# He says we are bluffing! Let's show him a big Card - and everybody in on the Pot.

*Put up your ante now in the*

## 3<sup>RD</sup> LIBERTY LOAN



In co-operation with the Liberty Loan Committee  
this advertisement is published by

**National Pneumatic Co., Inc.**

50 Church St., New York





# Worth Fighting For?

**S**HALL this little girl grow up in the sort of American home we know, healthy and happy? Shall she have the advantage of living and learning in a free land, under free institutions? Shall such children develop into Liberty-loving citizens that a free America may be proud of?

For over two hundred years Americans have fought valiantly, and died gallantly, to win for themselves and hand down to their posterity the blessings of liberty, justice, self-government and equal opportunity. This precious heritage, bought at so great a price, is now threatened.

**The question which today confronts America as a nation, and you as an individual, is whether or not a free America is worth fighting for**

Are American children in this and all future generations to receive unimpaired the legacy of freedom of which we are now the custodians, or shall their country be turned

over bodily to the brutal, rapacious, power-mad enemy which has forced us into this war?

This question cannot be answered by word of mouth, but by deeds alone.

**Let your answer be your investment in**

# Liberty Bonds!

In co-operation with the Liberty Loan Committee this advertisement is published by

**SKF BALL BEARING CO.**  
Hartford, Conn.

If you would like reproductions of this page singly or in quantities let us know.



YOU are asked to save every cent not needed for your reasonable support and physical well being—this is thrift

# Bonds Are Not A Burden But A Blessing



**T**HRIFT requires the exercise of restraint and self-denial—qualities without which you cannot achieve the success in life which it is your ambition to achieve, and for the lack of which you are likely to suffer in later years.

The money you acquire by thrift you are asked to loan—not give—to your country. It will come back to you when you may need it far more than you do now, and you will be paid interest for its use.

This war is a frightful thing, but it may prove of inestimable benefit to you, if it teaches you the good habit of thrift. Start the habit by investing in

# Liberty Bonds



In co-operation with the Liberty Loan Committee this advertisement is published by

**Westinghouse Traction Brake Co.**  
Wilmerding, Pa.



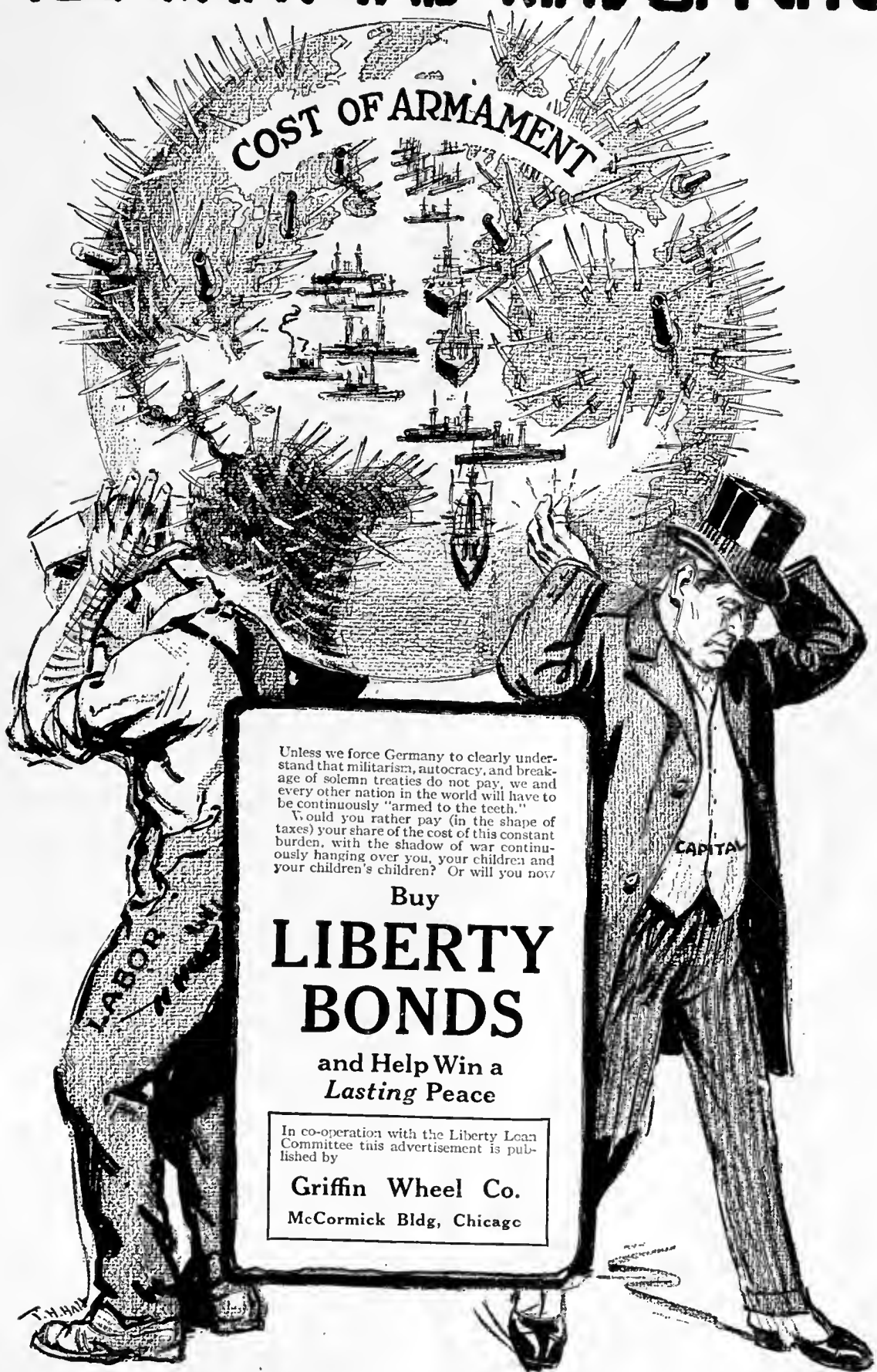
**"And there is a lot  
more up the river  
than has ever come  
over the falls."**

Our business is mighty important to us  
but we are more than glad to substitute  
for our own message on this page the  
message of the Liberty Loan.

**Railway Improvement  
Co.**

61 Broadway, New York

# DO YOU WANT THIS KIND OF PEACE?



COST OF ARMAMENT

Unless we force Germany to clearly understand that militarism, autocracy, and breakage of solemn treaties do not pay, we and every other nation in the world will have to be continuously "armed to the teeth."

Would you rather pay (in the shape of taxes) your share of the cost of this constant burden, with the shadow of war continuously hanging over you, your children and your children's children? Or will you now

Buy  
**LIBERTY  
BONDS**

and Help Win a  
*Lasting Peace*

In co-operation with the Liberty Loan Committee this advertisement is published by

**Griffin Wheel Co.**  
McCormick Bldg, Chicago



# VICTORY

We are  
going to

## Win This War

The victory, like everything worth while in life, will require sacrifice, self denial, ungrudging effort.

In defense of Liberty, Justice and Civilization, we must use every weapon at our command. And not the least of these is money. Never in the history of the world has there been a truer cause. Invest in

## Liberty Bonds

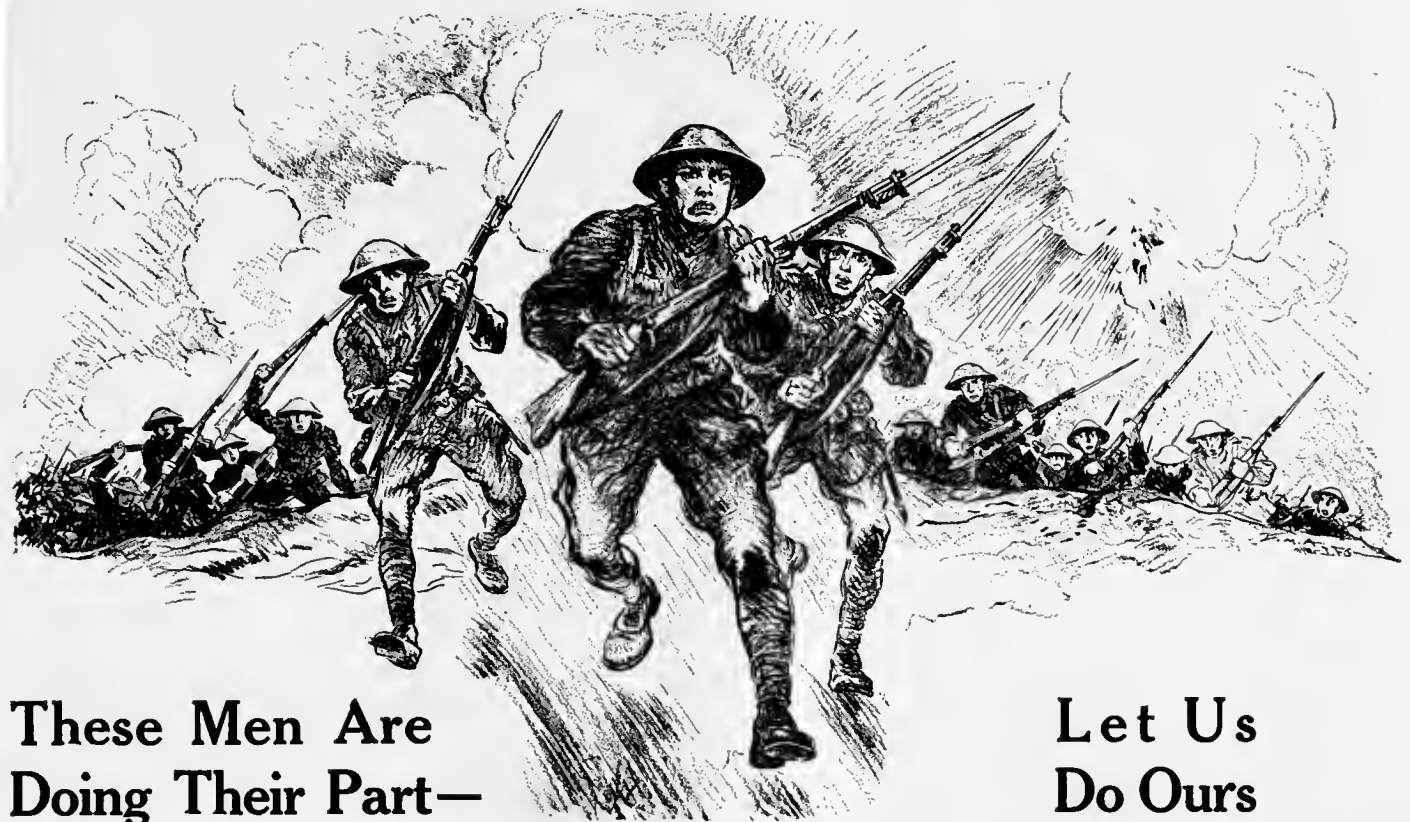
In co-operation with the Liberty Loan Committee  
this advertisement is published by

**American Brake Shoe &  
Foundry Co.**

30 Church Street, New York







**These Men Are  
Doing Their Part—**

**Let Us  
Do Ours**

**I**F the free peoples of the earth are not to become toiling millions for the Prussian Junkers and the Prussian Krupps, if they are not to be terror-ridden slaves at the mercy of a German Kaiser's will, Prussianism must be driven back within its own borders and kept there.

That is why the war must be fought on European soil. We are fighting in Europe now that we may not have to fight in

America, on the very thresholds of our own homes, later.

We are fighting for the safety and liberty of our children, our homes, our country. No price is too great to pay for Victory.

Americans, you are called upon to back our armies in France, to furnish them the guns and shells and ships and airplanes, the enormous quantities of every sort of supplies that they must have to defeat the Prussian armies and drive them back across the Rhine.

***The War Is Being Fought in Europe.***

***But It Must Be WON Right Here at Home***

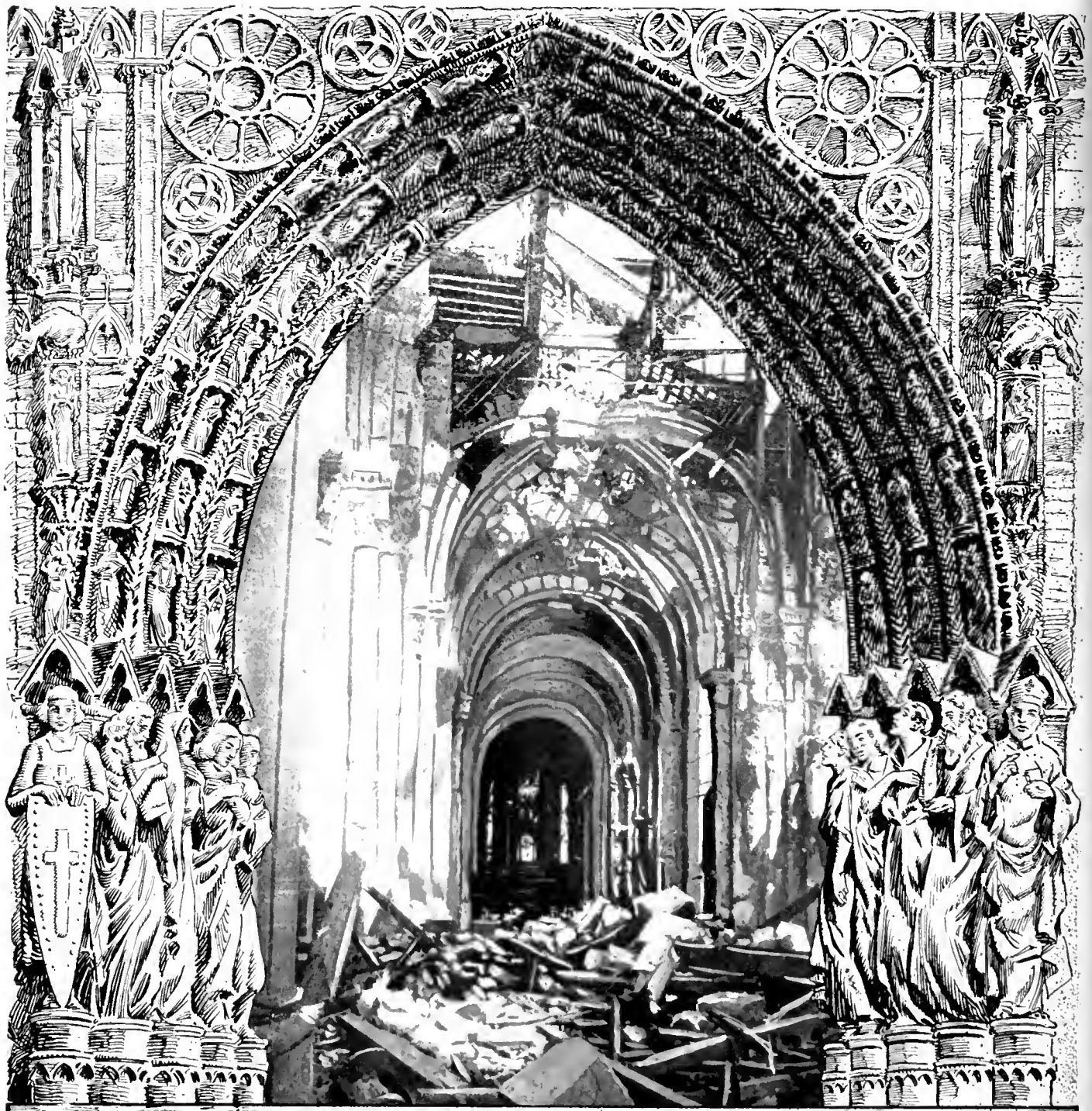
**Invest to-day in Liberty Bonds, *ALL* the bonds you can**

In co-operation with the Liberty Loan Committee  
this advertisement is published by

**Bertha Coal Co.**


**Chamber of Commerce Bldg.**

**Pittsburg, Pa.**



Shall the Civilization of the Ages  
vanish before  
the Devilization of the Hun?  
*One hundred million freemen answer*

**NO—**

A detailed illustration of a hand operating a Rico Coasting Recorder. The hand is shown from the side, with the thumb and index finger pressing down on a lever. The lever is part of a mechanical assembly that includes a cylindrical component and a rectangular base. The background is a textured, stippled grey.

Begin Your  
Fuel and Labor  
Saving Campaign  
at the Controller  
with

# Rico Coasting Recorders

*More coasting will*

Save coal at the power plant

Secure more service per car

Prevent waste of man power.

These are not possibilities or probabilities; they are *facts*. Scores of Rico operators have put these economies into practice.


**Time is the Essence of Railroading**

RAILWAY IMPROVEMENT CO.

61 BROADWAY, NEW YORK

# Mr. Railway Man

## One of these Books Belongs to you

An illustration of a man in a dark suit and white shirt, pointing his right index finger towards a book. The book is white with black text that reads "RENEWAL PARTS for CAR EQUIPMENT". The man is standing behind a dark, rectangular object, possibly a desk or a bookshelf.

This is a free service, organized for the benefit of our customers, to simplify the ordering of renewal parts when necessary.

Every Master Mechanic and Purchasing Agent of any street railway using G-E equipments is entitled to a

## Renewal Parts Catalog

They are not stock publications but are made up individually. Yours will be compiled exclusively for your road and will contain only that data covering your present G-E car equipments.

Many roads have been using these catalogs for years. You can enjoy the same privilege and its advantages. Ask our Schenectady office to make one up for your equipments.

## General Electric Company

General Office:  
Schenectady, N. Y.



Sales Offices  
in all large cities



# Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 51

New York, Saturday, March 30, 1918

Number 13

## "Daylight Saving" Can Help in the Peak-Flattening Crusade

WHEN this issue of the JOURNAL reaches its readers the "daylight saving" law will be in operation. The slight inconveniences incident to pushing the clock hands forward an hour will have already been overcome. To be sure, the early risers will feel for a while that, as far as the light is concerned, it is February instead of April, but the sensation will be no more than that due to a journey across a railroad time-zone boundary, or from a residence on the eastern slope of a mountain to one on the western slope.

The relations of daylight saving to railway operation have been covered thoroughly in previous articles in this paper. There is an additional phase of the subject which is worthy of attention now.

Electric railways in many parts of the country are taking the initiative in persuading merchants and manufacturers to modify their opening and closing hours to permit the railways to give better transportation service. The inauguration of "daylight saving" should assist them in this worthy effort. While the new clock time will go into effect with perfect smoothness, it remains true that the relation of "sun time" to clock time will be different. Some of those whose present working schedule fits in best with the natural lighting under the present clock time will have a tendency to maintain their previous relation to sun time; in other words to begin and close an hour later *by the clock* than formerly. If some users of the electric cars change their schedule and some do not, obviously the load peak will be flattened—in other words, the "diversity" will be increased. During the next few days, therefore, railway managers should take advantage of the period of transition to secure peak-flattening co-operation which at other times might be out of their reach.

## Buy Liberty Bonds and Help Sell Them to Others

THE third Liberty Bond sales campaign begins next week, Saturday. The government needs money just as it does men, and to be successful in the war we must raise \$3,000,000,000 as requested by Secretary McAdoo. To symbolize the situation, we are publishing a supplement with this week's issue illustrating how, if all pull together, it will be possible to haul the Kaiser off his pedestal.

The popular slogan during the coming three or four weeks will be "Buy Liberty Bonds." Electric railways, as far as their restricted resources will allow, will do their full duty in this respect, just as they eagerly did

in connection with the First and the Second Loans. But they can do much more; they can help to promote the success of the Third Loan by inducing others to buy bonds.

Electric railways are in an especially good position for presenting to employees and patrons the merits of Liberty Bonds. Through their regular publicity channels, through their ready means of close contact with employees, they can easily emphasize the need of monetary support to the last dollar. Indeed, as is shown elsewhere by the result of our canvass among some representative electric railways, the companies, by their work in the two previous loans, have already accomplished most if not all of the fundamental work necessary in educating people to become bond buyers. Now, therefore, they can make their main talking point the amount of bonds to be purchased, rather than the question of purchase itself.

The result should be increased sales. We hope so, for the government needs unmistakable evidences of the most loyal support. Does money talk? Then make it shout loudly enough to be heard in Berlin!

## Why Not Form Company Sections During War Time?

WE ARE pleased to note that the Rhode Island Company plans to form a company section of the American Electric Railway Association. It is more than a year now since the last company section was born, although during the three years preceding the formation of the Toledo section on Feb. 15, 1917, new sections were seeing the light at the rate of one every four and one-half months. As has been said in these columns before, if company sections are a good thing in time of peace they are or should be doubly good in war time. The function of the company sections is to increase the value of employees to the electric railway and at the same time to furnish new sources of inspiration and education to the men themselves. Of course, these two things go together because a man cannot be a more useful employee without being happier in his work, and *vice versa*.

It was inevitable that a slowing up of the activities of those interested in pushing the company section movement should have accompanied the putting of our country on a war footing. This, however, is now rapidly being accomplished and company section work should again begin to expand. Company sections should be organized as a war measure, if for no other reason, because they furnish the auspices under which patriotic movements can be furthered. This fact was clearly illustrated in the review of a year's work of the com-



pany sections printed in the issue of the *ELECTRIC RAILWAY JOURNAL* for Oct. 27, 1917, page 767. No other proof of the fact that these groups of enthusiastic men are contributing as groups to the winning of the war should be necessary.

The best way for the movement to spread is through the contagion of enthusiasm as has evidently happened in the present case. The highly efficient Connecticut Company section has apparently inspired the desire for an organization on the part of employees of the neighboring Rhode Island Company. It is significant that the evening of March 21 was "Rhode Island Night" in the Connecticut Company section, a suggestion of hospitality and propaganda to other sections. The best wishes of the *ELECTRIC RAILWAY JOURNAL* go out to the new section, which will be No. 12, and as it has done in the case of the other sections the paper will do everything in its power to further the work of this one.

### Cars Earn Money Only When On the Road

CLOSELY connected with standardized cars is the question whether such a car should be built to last, say, ten years or thirty years. We would say emphatically: For not more than ten years. It has been one curse of the electric railway industry that so much weight—and therefore money—was tied up in a car that it was financially impossible to take full advantage of progress in the car builders' art. Almost everywhere we see systems, a line-up of whose rolling stock reveals the history of electric railways from Van Depoele to date. The operators on these roads know full well that two, or even three, of these veteran cars are not equal in mileage revenue production to one new car. But the operating company usually has already sunk so much money in these veteran cars that when it comes to changing to one-man operation, for example, the management will spend \$1,500 on each of three old-timers, or \$4,500, instead of buying one new car of equivalent mileage possibilities for \$5,500 to \$6,000. Is it really easier to find money for such foolish rehabilitation and higher operating costs than to buy or rent new cars? If it is, a magnificent banking opportunity is being overlooked.

We have spoken of the new car as being three times as good in mileage production as an old car. This is not an exaggeration. We do not confine ourselves to schedule speed alone but have in mind the frequency with which the old cars are laid up for days at a time. The trouble is that too many managers look at cars from a mechanical viewpoint instead of one based on their transportation or mileage-production capabilities. The fact that a car has served fifteen years doesn't mean much unless we know whether it has averaged 10 miles or 100 miles a day during this period.

Herbert Spencer has said that human life should be measured by breadth as well as length. So may we say that car-life should be measured not only by years but also by miles. It is better to build a car light and operate it so intensively that it will average 50,000 miles a year for ten years and then replace it out of savings by the very latest type, than to get the same mileage in a generation out of a lumbering schooner. "Better fifty years of Europe than a cycle of Cathay!"

### More Attention Should Be Paid to Transfer Problems

THE transfer question will not down. It is so inseparable a part of the financial side of the traction industry that wherever the matter of adequate revenue is under consideration the extent to which transfers are used must also be studied. This was done for the benefit of the Massachusetts Public Service Commission by Mr. Beeler in his report on the Boston situation, with most interesting results.

The Boston management has been progressive in fare collection methods and has given serious consideration to means of checking abuse of the transfer privilege. The combination of rapid transit and surface car systems had made this problem a complex one. The company has done more than any other, perhaps, to extend the use of prepayment stations which provide for bodily transfer of passengers and a consequent reduction in the use and abuse of paper transfers. Nevertheless, the annual loss from the abuse and misuse of transfers has been estimated by the company as between \$200,000 and \$250,000.

Whether or not the recommendations made by Mr. Beeler for a reduction of this loss will prove effective under the "local conditions" of Boston, the fact remains that the transfer privilege is always possible of abuse, and railway managers everywhere must place more safeguards over it. Potentially every transfer ticket is equivalent to a 5-cent fare, and wherever it is used by any one who is not entitled to it in lieu of fare payment, the company is defrauded by the full amount of the fare and has just the same operating expense as though it had received cash.

To effect a reform in transfers, the most important thing, first of all, is to forget that a transfer ticket is "free." Employees must be impressed with the fact that it represents value, and considerable value. If a company pays 20 cents a thousand for printing them and then redeems from the persons who have secured them fraudulently the cost of transfers to the company is not 20 cents but \$50 a thousand.

One of the most useful committees of the Transportation & Traffic Association is the one which has been reporting for years past on the question of fares and transfers. Time and again members of that committee found an apparent indifference on the part of railway operators when inquiries were being made as to transfer practice. The same operators may have been keenly alive to methods for safeguarding cash fares, but to them a transfer was a mere bit of paper—a token which entitled the holder to a continuing ride under certain conditions. It did not seem to matter if an unscrupulous employee gave a bunch of them to his friends, and if a passenger occasionally imposed on the conductor by making a round trip for one fare. That was "only an incident of the business." Statistics showed that transfer passengers during a ten-year period increased at more than twice the rate of revenue paying passengers, yet the necessity of protecting the transfer was not generally appreciated.

A communication which appeared in the Nov. 10, 1917, issue of this paper, page 866, was intended to call attention to these conditions. A careful rereading of that article would not be lost time for the railway man. If the Boston system is losing \$200,000 or

more each year through its transfers, it is not unlikely that other companies are failing to secure a large amount of cash which they ought to receive from passengers. To obtain this cash it is possible that the legitimate use of the transfer privilege may have to be restricted, and it is certainly true that its misuse ought to be minimized. The possibilities of securing additional revenue through this channel should not be overlooked.

### What the War Finance Bill Will Do and Will Not Do

THE conference on the war finance bill between the representatives of the House and the Senate has been continued this week, and possibly by the time this paper comes to its readers agreement upon its final form will have been reached and the bill passed by both branches of Congress. The time will be none too soon to help the public utilities of the country which have maturing obligations to meet.

That such help should be granted by the government is obvious. If it were not for the needs of the government in financing itself, these obligations could be met. But with the government loans monopolizing the money market, and properly so, the utilities naturally have to stand aside.

But the passage of the war finance bill does not mean that the government will necessarily assume all of the burden of caring for all of the obligations of solvent public utility companies which mature during this period of financial stringency caused by government borrowings. Owners cannot shift the whole burden on Uncle Sam even if they wish to do so. Although the bill has not yet been enacted into law, it is evidently the intention of the government to put a considerable portion of the onus of caring for these maturities on those directly interested in the properties. They must show this faith and do their share in behalf of their own enterprise. It is only after they have exhausted every reasonable effort to refinance their property through the regular banking channels that the federal government may be called upon for help. The announcement on March 28 by Mr. McAdoo of the terms on which the government is taking up the New Haven notes gives explicitly the reasons for the action taken in that case.

This does not mean, however, that a company ought to be obliged to defray all of the expenses of preparing its property to take care of war business. This is an entirely separate question from that of refinancing, but it is one which is being faced by a number of companies at the present day. They are so situated that additions to their equipment, say, for transportation or power, would be very useful to war workers in the present emergency. They realize, however, that this service is not profitable in itself and that the additional equipment will cost perhaps double its normal price if installed now. In such cases we believe the government can properly look upon the extra expense as a war charge and as such assessable on all the taxpayers rather than solely upon the owners of the particular utility concerned. Otherwise, a company which undertook this work would be greatly handicapped after the war if it should have to meet in competition a new company with equipment purchased at normal prices.

### Conserve Resources by Reducing Waste of Unprofitable Lines

“THE history of street railway development throughout the country has shown very clearly that many lines have been built which should never have been constructed.” In these words the Street Railway Investigation Commission, which recently reported on problems relating to street railways in Massachusetts, summarized an unhappy story which is ancient history in some cities and current fact in other localities.

Everyone is familiar with this feature of the early development of transportation when the success of some projects made it appear that electric railways could make money almost anywhere. Such experiments were not always a success, and when these non-paying lines were later merged into a large system they frequently continued as a burden for which the charges had to be carried by the rest of the property.

We have already spoken of the desirability of slowing up on extension work during war times. For the same reason electric railways can well be permitted to cut down or even temporarily abandon operation on some of their unprofitable routes. The special Massachusetts commission, in discussing this subject, mentioned several alternatives, one of which was that in case the continuance of a line is sufficiently important to the community the company could receive some form of subsidy or community assistance. This might be arranged for in certain instances and would appear to be a reasonable solution. The Oregon commission in the Portland case referred to an instance of subsidies which had proved insufficient to cover losses of operation on certain routes.

It is a simple matter to tell whether a line is on a paying basis. The disproportion between car-miles and earnings per mile will show this, and if the figures for a system are carried also on a car-hour basis the manager will come pretty close to knowing what parts of the road are bringing in the net income.

There are cases where the public authorities designate what extensions should be built. This arrangement must not be criticized if the new lines are constructed where they meet the traveling needs of the community. If it should develop, however, that mistakes have been made in choosing certain locations for service the public should see that the wrong is undone. It may be necessary to tear up the rails for junk and abandon service in that district.

Neither the company nor the people should tolerate such examples of non-paying lines as one mentioned in Massachusetts where it costs nearly 50 cents per passenger, and another where the taxes alone amounted to more than the gross receipts. Rather should they adopt the frequently commended plan of Cleveland where when real estate promoters desire to enhance the value of their land by providing transportation facilities, they furnish money to the company to build the desired extensions, and in some cases pay deficits on these lines until they become self-sustaining parts of the property. Such plans are worthy of serious thought, especially in these times when economies must be practised to the limit to make even the most heavily traveled lines pay a fair return on the investment.

# The Cause Is Holy; the Effort, Timely

By T. P. SHONTS

*President Interborough Rapid Transit Company, New York, N. Y.*

**T**O THOSE who appreciate the value of service—in the highest sense of the word—the Third Liberty Loan campaign offers both opportunity and inspiration. The opportunity lies in the timeliness of effort for the general welfare, and the inspiration in the holiness of the cause.

Now, more than ever before, the need for indomitable courage presents itself. With the progress of the great war the complications resulting have become so numerous and vital as to emphasize most strongly the urgent need for every man to do his full duty. It has been impressed upon us by one incident after another that the great goal we have before us, the winning of this war for freedom, can be attained only through whole-hearted co-operation and exertion by every one of our citizens.

To those accustomed to the vagaries of public demand, especially in a field so wide as that of public utilities and so open to criticism, these considerations should have a special appeal. The man who expects a challenge every few minutes of the day, or a delegation of irate citizens every few hours, or a complaint from an official body every few days, has gained experience which should stand his country in good stead in this hour of need.

He has learned the lesson of serving others, and can adapt it and mold it to patriotic uses now. He can be of tremendous aid in spreading the gospel of the Liberty Bond. In hundreds of ways he can assist in this campaign to provide the funds needed in our great emergencies, whether it be by advertising methods or other-

wise. And in doing these things he can have a satisfaction more real than the cheerful feeling that pervades him when he is able to meet the needs of the public in his own field of activity.

To the patriotic man in the public utility field today service in the great Liberty Loan campaigns should and must be regarded as a point of honor, just as completely as service in our military and naval forces is regarded as a point of honor among our brave young men. To the hundreds of us who have relatives and friends at the front it is almost unnecessary to say these things. For the others, too, it probably is unnecessary to emphasize these things, and yet it cannot be amiss to direct attention to them anew at this time.

Service in the great Liberty Loan campaigns must be regarded as an inspiration of the highest kind. It carries us away from the sordid view of life and makes us feel that we can capitalize in a most material sense the sum total of our experience, and capitalize it for a holy cause.

Needless to say, a large amount of the Liberty Bonds of the Third Loan will be purchased by the men in the traction field, but let us feel that our duty does not end there. Let us go further and do all that is in our power to get others to buy them—particularly those who have been able as a result of conditions to increase their earning power beyond all records. This refers especially to the various classes of workers whom it is ordinarily hard to reach in any campaign for the sale of investments.

## How the Electric Railways Have Been Fostering the

Canvass Among Representative Companies Shows  
Eager Desire to Aid Employees to Buy Bonds

### CHICAGO (ILL.) SURFACE LINES

L. A. BUSBY, *President*

On Oct. 10, before our Second Liberty Loan campaign, we issued a bulletin urging subscription by employees. A \$50 bond could be paid for at the rate of \$1 a week, or \$2 each semi-monthly pay day. Interest was allowed to employees on their payments at the rate of 4 per cent. The company offered to hold employees' bonds without charge for safe keeping, subject at all times after payments to the order of the owner.

Subscription blanks were furnished by receiving clerks and superintendents. As a result of the campaign, according to a bulletin issued on Oct. 27, more than 12,000 employees, over 90 per cent of the entire organization, subscribed to the Second Liberty Loan. The total of these subscriptions amounted to \$825,400.



In the transportation department, out of a total of 9277 men, 8876 men, or over 95 per cent, subscribed a total sum of \$558,750. In several of the divisions, every man subscribed. In every department the average was high.

*"The supreme test of the nation has come. We must all speak, act and serve together."*

—PRESIDENT WILSON

### NEW YORK STATE RAILWAYS, ROCHESTER, N. Y.

JAMES F. HAMILTON, *Vice-President*

The banks of Rochester took care of the subscriptions to the Liberty Loans, and through them our employees were permitted to subscribe and make partial payments without interest. The banks carried the loans and issued pass books to those subscribing through the company. We deducted each week from the employee's pay the payment due and issued a receipt which he took to the bank and had entered in his pass book.

We conducted our campaign for subscriptions through the heads of departments, each one making a personal solicitation among those under him. We posted advertising matter conspicuously on the property, and, in addition, each employee was seen in person.

# Make the Liberty Loan Your Business

By T. S. WILLIAMS

*President Brooklyn (N. Y.) Rapid Transit Company*

**W**HILE the war has brought inconvenience and sorrow to many homes, it has done much to foster a general appreciation of the value of unselfish public service. The emergency now faced by the nation calls for "team work" to such a degree that the doctrine of public service has been spread much more widely than was possible before the conflict started.

In other words, the public actually has learned to appreciate public service through having been forced to take part in it in a most thorough individual sense. Every good American to-day feels that whatever he can contribute to the success of the war in any field of activity constitutes the very least he can do. To a very great extent, the activities behind the battle lines call for unstinted co-operation, but at home the need for individual effort is much clearer and much more easily realized. Every one of us, for instance, recognizes that a boon can be conferred upon our armies by doing Red Cross work or work in some other field contributing to the comfort and safety of our troops. In undertaking work of this sort, each of us realizes that it represents a service to the country, as well as a service to the individual units of our fighting forces.

The Third Liberty Loan campaign presents an ideal opportunity for the rendering of similar public service. There are two ways to help in this great campaign. One is by buying the bonds and the other is by getting other people to buy them. In the long run, the man who encourages and persuades others besides himself to invest in these bonds is doing as great a service to the United States as if he made the total purchase himself.

The reason for this is that so far as the United States is concerned, the battle in which we are engaged to-day is distinctly a war of the people, by the people, for the people. Each of us will benefit equally by the overthrow of the dangerous forces now in control of Germany's future. In return for the common enjoyment of the privilege of freedom, it is the duty of everyone to work for the maintenance of the form of government which makes them possible. While that duty constitutes something which he should do for himself, it also demands from the average citizen the expenditure of effort in behalf of the entire nation. In this sense he is doing a public service when he promotes the success of Liberty Bonds, and he can promote it to the fullest extent by inducing his fellow citizens to understand it.

The tremendous support to be gained by the government through a very wide distribution of the new Liberty Bonds would be as great an argument against Kaiserism, as great a blow to the hopes of the Hun, as could possibly be given.

It, therefore, becomes the duty of each of us to adopt the Liberty Loan campaign as part of our personal business and to regard its promotion as being part of our own responsibility. The two elements of duty involved—that is, buying as many bonds as we can afford ourselves, and then getting others to buy their proportionate amount—are so thoroughly interwoven that they can hardly be distinguished. If one is considered, the other must be inevitably accepted. The opportunity is before us to justify our claim to be citizens of a free country, and the moment must not be neglected.

## Liberty Loan Spirit Among Their Employees and Patrons

**Companies Are Planning to Push Third Campaign  
When Details of New Bond Issue Are Announced**

**TWIN CITY RAPID TRANSIT COMPANY,  
MINNEAPOLIS, MINN.**

**EDWARD KAROW, Assistant to President**

During both the First and the Second Liberty Loan campaigns we gave a considerable amount of free advertising space in our cars and buildings for the benefit of the loan. We also posted bulletins at our various car-houses, shops and office buildings, outlining plans whereby employees could subscribe to the Liberty Bonds on easy payments, which would be deducted from their pay checks.

Department heads and foremen had subscription blanks. The company purchased from the government such bonds as employees might wish to order through the company, and allowed the employees one year in which to pay for them, in regular installments. During this year the company allows the purchasers 4 per cent interest on



the money paid in on the account. During the first campaign the plan was new and did not take as readily as during the second campaign. Then the subscriptions were extremely heavy. We are planning to follow the same general arrangements during the Third Liberty Loan campaign.

*Shall we be more tender with our dollars than with the lives of our sons?*

**UNION TRACTION COMPANY OF  
INDIANA, ANDERSON, IND.**

**W. H. FORSE, Secretary and Treasurer**

We made a campaign among our employees for subscriptions to the Second Issue of Liberty Bonds, and more than 500 of them subscribed for sums ranging from \$50 upward. Most of the subscriptions were for \$50 each.

The company agreed with the employees that payments could be made at the rate of \$1 a week for each \$50 face value of bonds purchased, deductions to be made semi-monthly from the pay checks. It was further agreed that in the event a subscribing employee left the service of the company or was unable to complete the payment as agreed, the company would, upon written request, refund the amount paid and cancel the subscription.

It is probable that the same plan will be followed for the Third Loan.



WASHINGTON RAILWAY & ELECTRIC COMPANY, WASHINGTON, D. C.

L. B. SCHLOSS, *Publicity Agent*

For the First Loan we did not enter into an extensive campaign among our employees, with the result that but 160 employees subscribed \$15,750 to the issue. The company, however, subscribed \$5,000, making a total subscription of \$20,750. A refund of \$877 has been made to employees who have left the employ of the company, or enlisted in the government service, or found themselves unable to keep up their payments.

The bonds were purchased by the company and sold to employees on a partial-payment plan. A white card [shown on page 606] was used to record the agreement and the payments. The plan provided for weekly, semi-monthly or monthly installments. A special partial-payment plan with pink cards was devised for trainmen. These men agreed to pay \$5 a month until the payments equaled the subscription, plus accrued interest at 4 per cent on the total and less 4 per cent interest on the installments from the dates of payment. In the event of discontinuance of payments, the company agreed to refund the amount already paid, without interest, in cash or in bonds plus cash, according to whether the total of the payments would permit the purchase of a bond.

In the case of the Second Loan we entered into an extensive campaign, with the writer as chairman of a committee of eighty employees, selected from all departments. Bulletins were sent to each member of the committee daily. As a result of the work, 745 employees subscribed \$44,900. In addition the company purchased \$50,000 of

the issue. Up to March 1, \$1,772 had been refunded to subscribers for the same reasons as in the case of the First Loan.

We carried dash signs on all cars advertising the loans, and regulation advertising matter furnished by the Treasury Department was displayed at our general offices, carhouses and shops. The company also contributed \$500 to the local-committee for advertising in the newspapers. Considerable reading matter in the news columns of the newspapers was given to the company for its efforts, which added interest to the campaign among employees.



VIRGINIA RAILWAY & POWER COMPANY, VA.

THOMAS WHEELWRIGHT, *President*

The officials and directors encouraged subscriptions among employees and underwrote subscriptions made on the installment plan. We have advertised the loans as freely as possible through *Public Service News* on the Richmond division and through *Public Service Chat* on the Norfolk division. We have been glad to furnish whatever publicity was desired and have also paid for many page advertisements in the newspapers throughout our territory.

THE CONNECTICUT COMPANY, NEW HAVEN, CONN.

L. S. STORRS, *President*

Through the courtesy of Morgan G. Buckley, president Aetna Life Insurance Company, the Aetna plan for deferred payments on First Loan bonds was afforded to the employees of the Connecticut Company. This plan provides for the monthly payment of 5 per cent of the face value of the bonds subscribed for.

Prior to the active solicitation lists were circulated throughout the various departments. These were signed by individuals to indicate the amount for which they would subscribe. During the days of the active drive arrangements were made at carhouses, shops and other points for gatherings of the employees to be addressed by bond salesmen. This resulted in a total subscription of \$135,850 by 1925 employees. The campaign for the Second Loan was conducted in practically the same way, resulting in a smaller subscription.

No definite plans have yet been devised for the Third Issue, but a very active campaign is conducted constantly for the sale of Thrift Stamps and War Savings Stamps. The president of the company has been appointed an agent for the sale of such stamps, and he has appointed as sub-agents all cashiers, including express cashiers. A plan has been worked out for establishing honor rolls among the cashiers for the greatest monthly sales record, the idea being to recognize in some way the cashier having the best quarterly record.

UNITED TRACTION COMPANY, ALBANY, N. Y.

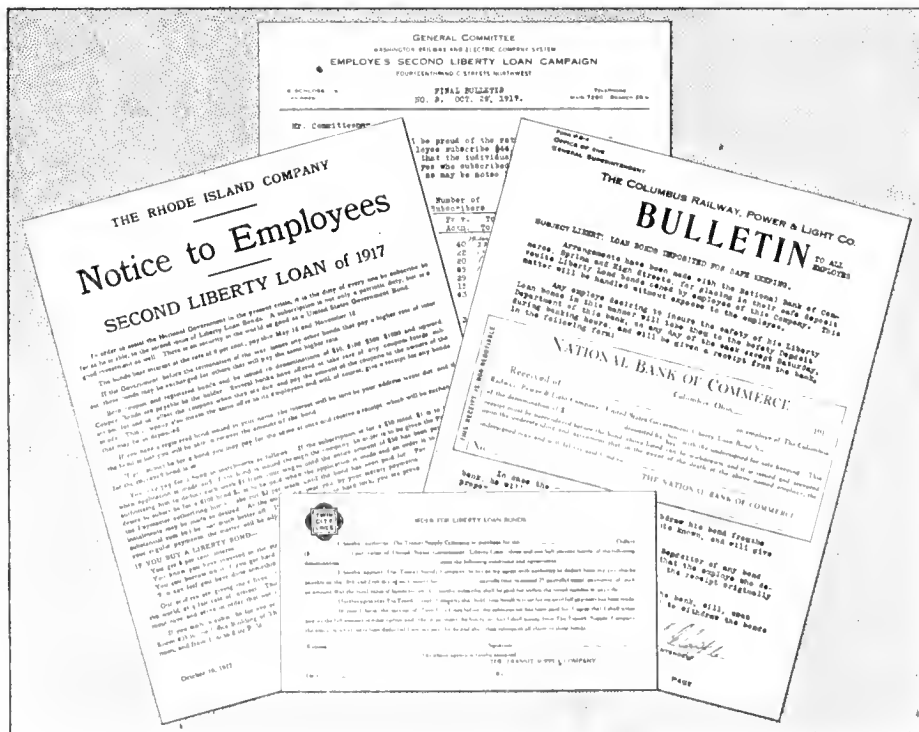
H. B. WEATHERWAX, *Vice-President*

During the campaign for the sale of both the First and the Second Liberty Loan Bonds our company held meetings at which officials addressed the men. They also in a few cases invited other speakers to address the employees.

The company advanced the money for the purchase of the bonds, and allowed the employees to pay for them on the plan of semi-monthly and monthly payments, the amount of each installment being deducted from the pay. Out of approximately 1580 employees, 1444 or 94 per cent subscribed for bonds to the extent of \$74,150 for the Second Issue.

The company also decorated some of its cars and conducted a parade through the streets of Albany and Troy. Photographs of these cars were published in the *ELECTRIC RAILWAY JOURNAL* of Nov. 10, 1917.

While no definite plans have been decided upon for advertising and assisting in the sale of bonds of the Third Issue, the campaign among our employees will be conducted practically in the same manner as for the previous issues.



BULLETINS AND OTHER BOND NOTICES ISSUED BY RAILWAYS



**THE RHODE ISLAND COMPANY,  
PROVIDENCE, R. I.**

**A. E. POTTER,**  
*President and General Manager*

To advertise the Liberty Loans, the Rhode Island Company posted notices announcing the issues and outlining the manner in which the employees might subscribe. [One of the notices is reproduced on page 604.] The payment plan provided for a weekly installment of \$1 for each \$50 bond. The company offered to take care of coupon bonds bought by employees and to collect and pay the coupons. The company expects to follow the same procedure in connection with the Third Loan.

**PUBLIC SERVICE RAILWAY,  
NEWARK, N. J.**

**J. L. O'TOOLE,** *Assistant to President*

In connection with the First and Second Liberty Loan campaigns we displayed posters in all of our cars and on the bulletin boards at the various carhouses. The company also caused a number of meetings of employees to be held. These meetings were addressed by a representative of the company, who explained in detail what the Liberty Bonds meant and how they could be subscribed for.

The company adopted a plan of carrying employees' subscriptions while the men were making payments at the rate of \$1 a week for each \$50 bond. The employees responded generously in both the first and the second campaigns. No concerted action has been taken as yet with regard to the forthcoming issue, but it is altogether likely that similar efforts will be put forth.



**CAPITAL TRACTION COMPANY,  
WASHINGTON, D. C.**

**J. H. HANNA,** *Vice-President*

Poster signs were carried on the front of our cars during the first and second campaigns, and notices were posted on the bulletin boards in the various carhouses to induce the men to purchase bonds to the best of their ability. In the second campaign a series of meetings was held in all divisions. Addresses were made by different officers of the company, and some success was attained in the sale of the bonds.

We have made no plans in connection with the Third Loan, but we will undoubtedly advertise it on our cars and bring the matter to the attention of our employees.

**INTERNATIONAL RAILWAY,  
BUFFALO, N. Y.**

**E. J. DICKSON,** *Vice-President*

The work which we consider most essential in a campaign of this kind is to advertise it thoroughly among our employees before any energy is used in the obtaining of subscriptions. In order to do this we had four or five large posters placed in our carhouses, shops and all other conspicuous places where our employees could not help but be impressed with the vital importance of the sale of Liberty Bonds.

Then we arranged to have literature explaining the reasons why each individual should purchase Liberty Bonds, what the bonds were and how they could be purchased, delivered to each employee together with a letter from the company urging their purchase. This letter explained that the bonds could be purchased through the company for cash or by having a certain amount deducted each week from the pay; also from any bank for cash or by paying so much a week to the bank.

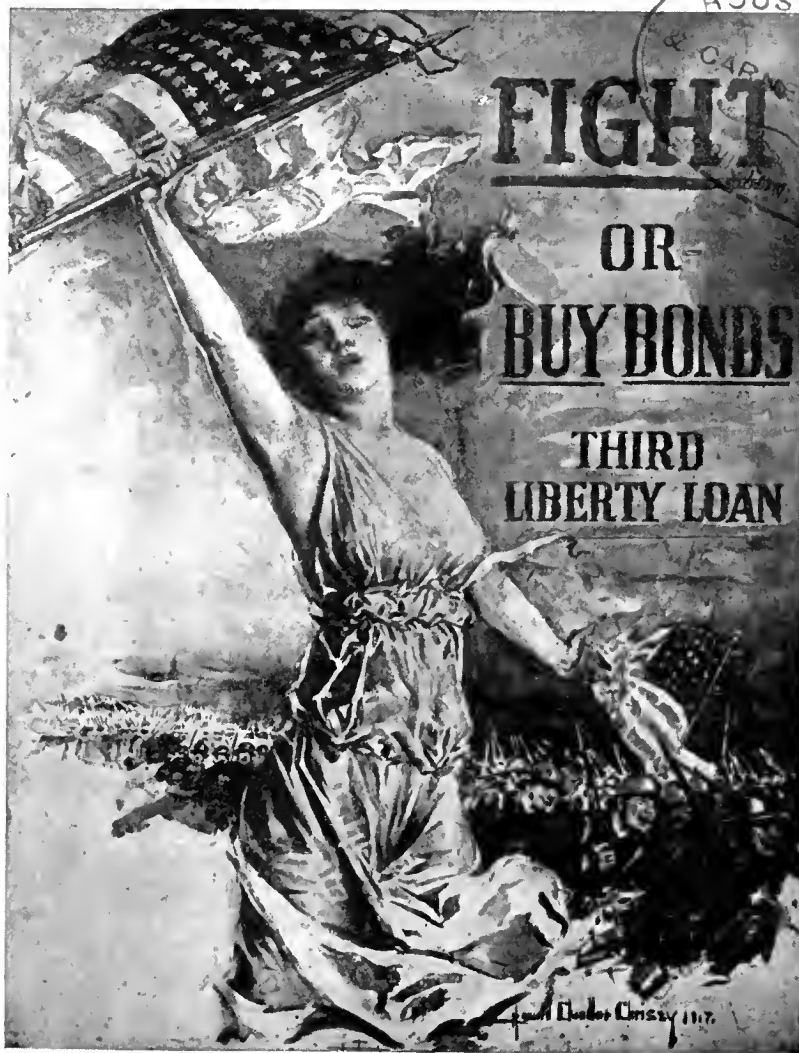
We held several meetings with speakers from the general committee in order to create talk and enthusiasm among the employees. In the meantime we organized committees and sub-

committees through the organization and told the chairmen that we wanted results and that each employee should be seen personally and urged to purchase bonds. All the committee members were furnished with application blanks and the necessary data for answering any questions that might be asked. After the meetings the committees were directed to start the campaign for subscriptions, and in three or

*They are doing their best "over there"; we must not fail in our duty over here.*

four days each employee on the system was approached in regard to buying bonds. The plan worked so well in the Second Loan that nearly 1500 subscriptions, amounting to more than \$115,000, were obtained.

At the present time we have not made any preparation for the Third Liberty Loan, as we do not know enough about it. We believe that by waiting until the details are worked out and then having a whirlwind campaign for subscriptions better results are secured than by dragging the campaign over several weeks.



THIS IS A MESSAGE TO YOU

## ILLINOIS TRACTION SYSTEM, PEORIA, ILL.

E. W. FOWLER,

*Assistant to Vice-President Executive*

Printed matter descriptive of the bond issues and the purposes to be served thereby was received from the government publicity committee, and copies were sent to each customer of our gas and electric properties, as per the addressograph list. Display cards were posted in our street cars, in our interurban cars and in the offices. Our gas and electric properties have a fixed amount of space contracted for with the newspapers in each community, and this space was used for suitable advertising concerning the bond issues.

All employees were urged to subscribe for Liberty Bonds. While the company purchased outright the bonds so subscribed for, the employee was allowed to make his payments extend over a period of ten months. Thus 5 per cent of the subscription was withheld from each semi-monthly pay check, and interest was allowed on payments so made.



other times as were found more convenient.

In addition this letter, cardboard bulletins urging subscriptions were posted in all the operating stations, shops and offices. These bulletins contained, in large type, but in fewer words, the information in the letters.

## KANSAS CITY (MO.) RAILWAYS

PHILIP J. KEALY, *President*

For the First and Second Liberty Bond issues this company carried placards on all cars. These were furnished by the local bond committee, and they carried an emblem identical with that on the buttons.

Blank applications for loans were circulated among our employees. These provided that payment be made in three monthly installments or ten monthly installments, each applicant designating the bank at which it would be preferable for him to pay.

Regarding the third issue of Liberty Bonds, we are going to do something along the same lines.

## COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO

SAMUEL G. MCMEEN, *President*

We issued several bulletins and pamphlets to employees during the First and the Second Liberty Loan campaigns. Two of these are shown in the illustrations on pages 604 and 607. In the first campaign we used the printed material in connection with addresses on patriotic duty and thrift, these addresses being made by officers of the company, heads of departments, etc. Weekly installments of \$1 per each \$50 bond were permitted, and subscription blanks were filled out by department heads.

We omitted much of the fundamental work in the second campaign, because by that time all our people were more fully informed. We conducted the details through the regular channels of our organization, sending out information and receiving the results just as if the transactions were a matter of detail routine business of our own affairs.

This actually amounted to a test of efficiency between special and standard methods, and we were gratified with the results of the second campaign because they were as good as in the first, and, of course, were secured at much less cost of time and nervous energy. The results in both cases were gratifying financially, and we have felt that our group acquitted itself well.

## CHICAGO (ILL.) ELEVATED RAILWAYS

BRITTON I. BUDD, *President*

A campaign was organized and conducted for the first and the second bond issues through the heads of departments, each of whom delegated certain persons to solicit subscriptions. In the shop department shop foremen and clerks assisted in soliciting; in the maintenance of way department the foremen and their clerks handled the subscription list; in the transportation department the superintendents, clerks, trainmaster, dispatcher and others all worked to obtain subscriptions. A point was made to urge each employee to subscribe for bonds.

When the campaign opened, notices were posted in the trainmen's rooms, stations and shops, directing the attention of employees to the advantages of subscribing and urging them to do so. Large supplies of printed matter, setting forth the attractive features of the bonds and urging subscriptions on the ground of patriotism as well as savings, were distributed, a copy being given to each employee.

Two plans of payment were adopted, a cash plan and a deferred-payment plan. Under the cash plan, for the First Loan, the subscriber had until July 15, 1917, to pay for his bond, the subscriptions closing on June 15. For the Second Loan, subscriptions for which closed on Nov. 15, he had until Jan. 15 to pay. The deferred-payment plan provided for twenty equal semi-monthly payments, which could be made either by deduction from wages or salary due the employee, or by cash payment at the treasurer's office. Interest at the same rate carried by the bond is allowed on all payments from the date the cash is received.

*There is immediate, urgent, imperative need for every dollar you can possibly spare.*

We have consistently encouraged those who have been making payments on the deferred-payment plan to anticipate the payments and take up the bonds before the end of the allotted period.

While our plans with reference to the Third Issue of Liberty Bonds have not yet been perfected, we expect to proceed on the same general lines.

## BOSTON (MASS.) ELEVATED RAILWAY

M. C. BRUSH, *President*

Upon the announcement of the First Liberty Loan, our company appointed a committee to carry out a very active campaign throughout the entire property. Arrangements were made by this committee with the Second National Bank to take over the entire subscriptions of our employees. Many posters were distributed and displayed at our offices, carhouses, power stations and shops, and speakers were procured from

(Original or Duplicate) No. \_\_\_\_\_

**Washington Railway & Electric Co. System**

**EMPLOYEE'S SECOND LIBERTY LOAN  
PURCHASE CONTRACT**

Date.....1917.

TO WASHINGTON RAILWAY & ELECTRIC COMPANY

I am advised that you are purchasing certain United States of America 4% Liberty Loan Coupon Bonds. I desire to become the owner of such bonds to the amount of \$..... par value, and hereby authorize you to deduct this sum from my wages in..... weekly semi-monthly installments of \$..... each, commencing the last half of October, 1917, upon the mutual agreement that when these deductions equal the total amount of this subscription (plus accrued interest at 4% from October 15, 1917, on said total amount, and less 4% interest on installments from dates of payment) you will deliver to me 4% Liberty Loan Coupon Bond, par value, to the amount of this subscription. If, at any time, for good and sufficient reason I find it necessary to discontinue such installment payments, you agree to refund the payments already made by me, without interest, except that if payments already made have been sufficient, bond of the proper denomination, under the terms covered herein will be delivered, and only the excess of deposits over the bond so delivered will be refunded.

Accepted and confirmed for W. R. & E. Co., by Signed by..... (Name of Employee)

..... (Name of officer or agent) Occupation.....

Pay Roll No. ....

..... (Title) Division.....

Received of Washington Railway & Electric Co., United States of America 4% Liberty Loan Coupon Bond No. .... in fulfillment of above contract.

..... (Name of Employee)

## EXAMPLE OF BOND CONTRACT OF WASHINGTON RAILWAY & ELECTRIC COMPANY

### CLEVELAND (OHIO) RAILWAY

H. J. DAVIES, *Secretary and Treasurer*

The company sent out circular letters to its employees in regard to subscriptions for the First and Second Liberty Loans, urging them to buy bonds and telling them how the company would allow payment to be made within a year. The employees were permitted to authorize deductions from wages or to make payments at such

the local Liberty Loan committee. Committees were organized at each car-house to report directly to their division superintendent. These made their report direct to the committee of three at headquarters. Applications were accepted on the government plan, weekly plan, and monthly or cash-payment basis. A great number of the employees subscribed on the weekly basis. A total subscription of \$325,000 was the mark reached in the First Liberty Loan, and there have been very few withdrawals or cancellations.

The Second Liberty Bond issue was conducted in a similar manner, with the exception that the bank made a few changes as to the manner in which deposits should be received. The amount of bonds subscribed for by employees of this company was \$59,000.

*Put your money in the Bank of Liberty and help wage the war of the people.*

We intend to advertise the third issue just as strongly as we have the previous two. Instead of handling it directly through our own organization, however, we are going to work hand in hand with the local committees and banks and persuade the men to make their payments directly to the bank or committee in their locality.

**TOLEDO RAILWAYS & LIGHT COMPANY, TOLEDO, OHIO.**

**FRANK R. COATES, President**

After two successful campaigns for the sale of Liberty Loan Bonds in Toledo, in which the company contributed greatly toward the splendid results, we have started on our third campaign of co-operation with the government for the coming big drive. While we plan to do greater things from an advertising standpoint in the third drive, we shall not have a company organization in the field, in order to avoid conflict with the general sales organization which will be headed by the president of the railway, as formerly.

When the first sale of Liberty Bonds was held, the company not only placed the inside and outside advertising space of its 300 or more cars at the disposal of the local committee, but coined a number of slogans and donated the posters which were used in the street-car advertising. These were kept in the cars for some time before each campaign started and during the weeks of the sale. A large electric sign, reading "BUY LIBERTY bonds NOW," was donated by the president and placed at the most prominent location in the city while the sale of bonds was on.

A committee of company employees was also organized to handle the sale of bonds among the 2000 employees of the company. Through the efforts of this committee about \$82,000 of bonds



were disposed of during the first sale of 1917 bonds.

The same committee worked among the company employees during the Second Liberty Bond campaign, and \$63,000 of bonds were sold to company employees. In both the First and Second campaigns arrangements were made whereby a certain sum would be deducted from the pay of each employee, the payments to be completed in a year's time.

Beginning on Monday, March 18, and continuing for a period of seven weeks, the Toledo company will use the advertising space, both inside and outside the cars, for Liberty Loan advertising only. The company will pound continuously during this period upon the importance of buying bonds of the third issue, and it expects to aid materially in the sale of Toledo's quota, which will be \$20,000,000.

The large electric sign urging everyone to buy Liberty Bonds will be again erected. The sale of bonds to employees will be handled by salesmen from the general sales force, which will consist of about 3000 persons.

**CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME.**

**A. H. FORD,**

*Vice-President and General Manager*

To assist in making the campaign for the sale of the First and the Second Liberty Loans a success, the Cumberland County Power & Light Company, together with its subsidiary companies, viz., the Lewiston, Augusta & Waterville Street Railway, the York County Power Company and the Westbrook Electric Company, "carried on" as follows:

The company's part consisted in agreeing with its employees to purchase whatever bonds the employees subscribed to and to hold them until the full amount of each subscriber's bond had been paid for. Payments were to be at the rate of \$1 a week for each \$50 bond. Upon final payment the company was to turn over to

*Each and every American has a personal responsibility in making the Third Liberty Loan a success. Everyone must contribute to the ending of Kaiserism by buying bonds himself as far as he can and perhaps even more by making unceasing efforts to persuade others to buy them.*

the employee the total number of bonds purchased, together with all the coupons.

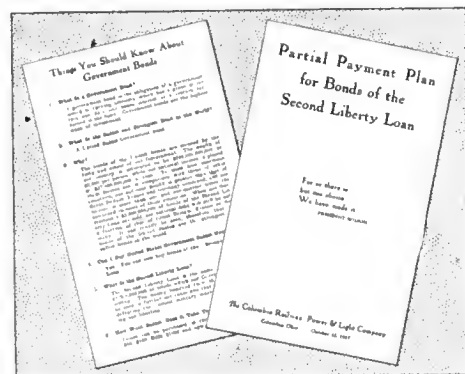
The employees' part consisted in appointing a member from each department of each company to canvass thoroughly all the men in his department for subscriptions. The result in the case of the Second Loan was a total subscription of \$45,100, the total number of men employed being about 1400.

It is our intention to conduct a similar campaign for the third issue of Liberty Bonds.

**MAHONING & SHENANGO RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO.**

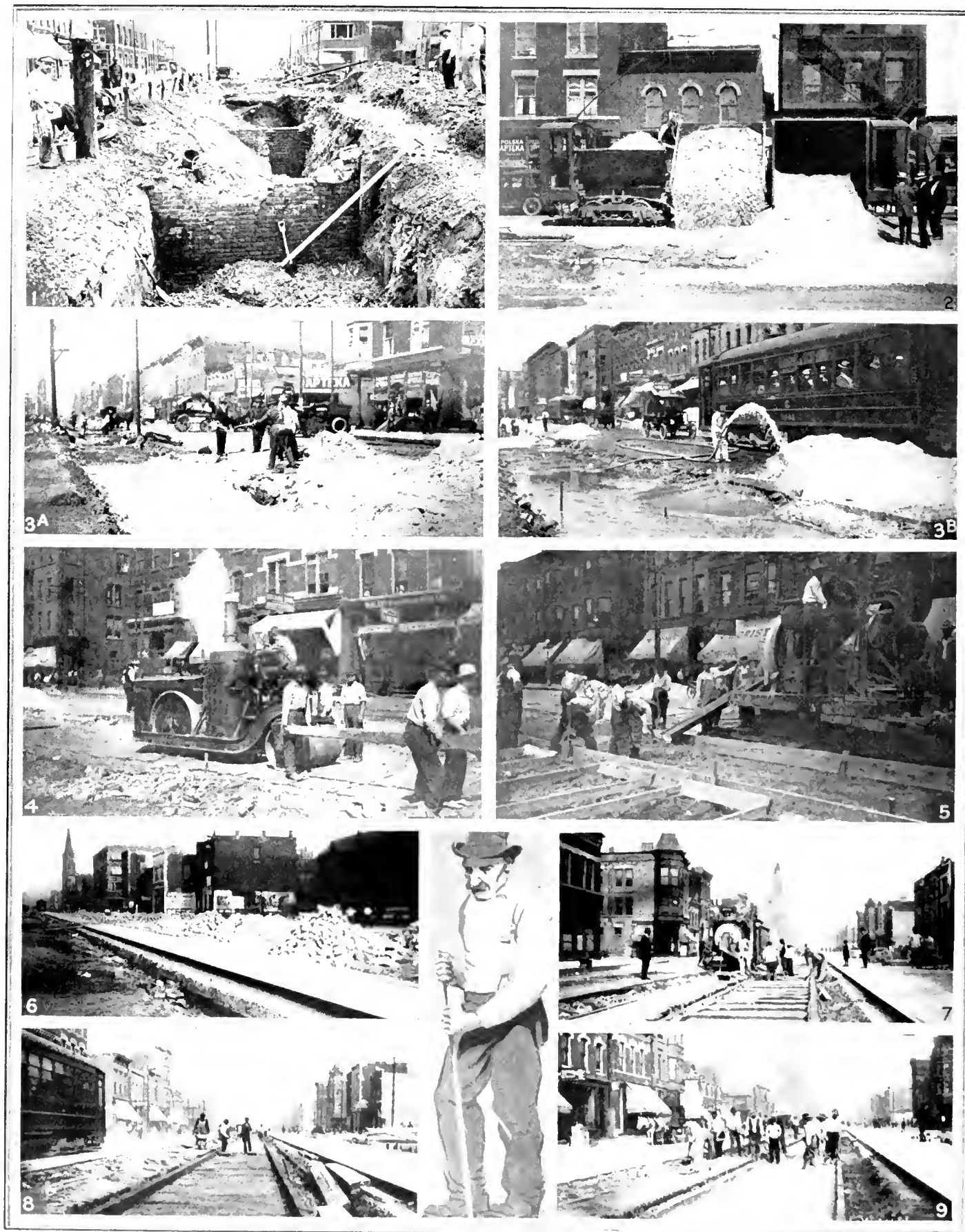
**R. P. STEVENS, President**

Our company was quite active in the First Liberty Loan campaign, carrying the bonds for the employees. At the time of the second campaign, we were in the throes of financing our floating debt and did not have the cash available to go into the matter in a broad way. We thought it advisable not to attempt any active steps toward financing purchases by our employees at that time.



BOND BOOKLET AND CATECHISM USED IN COLUMBUS, OHIO

We have had under discussion the matter of the company's participation in floating the Third Liberty Loan. It has been decided that although it will probably be inadvisable for the company to finance employees on account of purchases of these bonds, we will, however, donate the services of our stock sales department (which department we have organized, with a large number of salesmen, for the purpose of selling our preferred stock) to the sale of Liberty Bonds. We think we can serve the government in this way. It is believed that where an employee's capacity for saving is limited to \$5 or \$10 a month, it will be better policy to advise such employees to purchase Thrift Stamps instead of attempting to buy Liberty Bonds by borrowing the money. We feel that by having our sales force devote its entire time during the campaign to the sale of the bonds in the local communities, we can probably accomplish more than by directing their efforts among our employees.



1. Uncertain right-of-way on which new track had to be placed.
2. Sand for filling hauled in side-dump cars.
3. (a-b) Shoveling and washing sand into holes.
4. Rolling the filled-in right-of-way.
5. Pouring between outside forms with curbing forms ready to use.

6. New eastbound track completed.
7. Inside forms in place as curbing is poured.
8. Forms removed and layer of screenings going in.
9. Placing the ties and removing paving from old track.

Photographic Description of Chicago Track Construction Methods



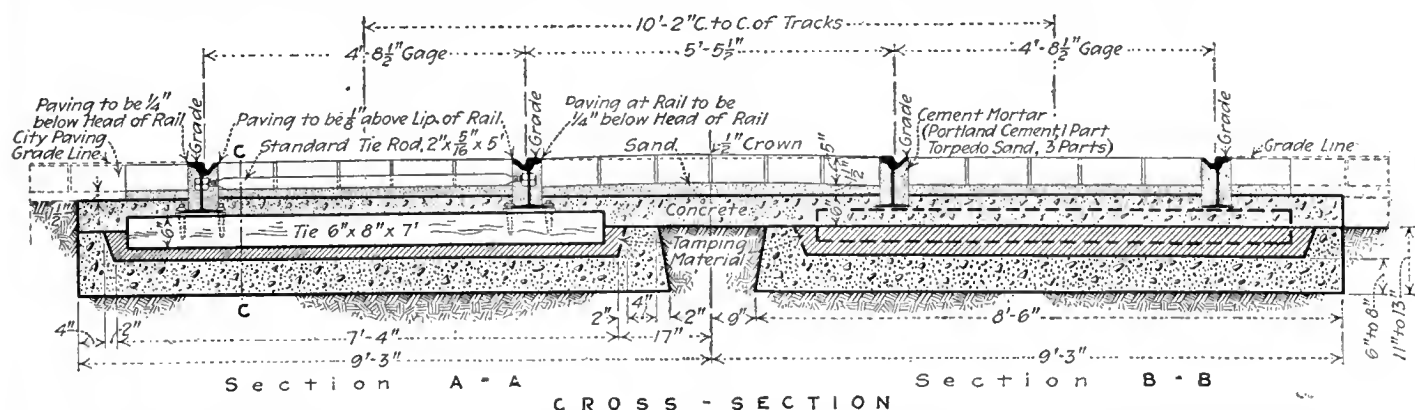
# Track Construction Methods Employed in Great Street Widening Plan

**Increasing Width of Twelfth Street Necessitated Complete Rebuilding of Double Track of Chicago Surface Lines—New Type of Sub-Grade Construction—Many Labor Saving Devices Employed to Keep Ahead of the Paving Contractor**

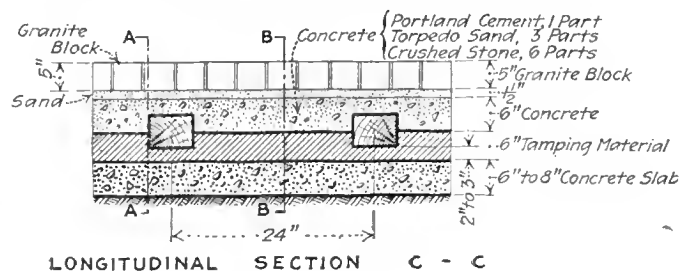
**T**AKING up two well-laid tracks set in concrete construction, moving them more than 20 ft., and placing one of them along what was formerly the front end of a store basement, was, in brief, the part that the Chicago Surface Lines had to take in the \$2,000,000 plan of widening Twelfth Street, one of the principal east and west thoroughfares of Chicago. The width of the street was increased along the south side from 66 ft. between building lines and 38 ft. between

to keep out of the way of the paving contractors who, with their \$500,000 contract for 60,000 sq. yd. of pavement, were working under a time-penalty clause.

The story of the construction job from the time the railway company began its work until the track was completed is fairly well portrayed in the series of pictures herewith reproduced. Before the railway company began work the contractors had moved back or cut off the front section of buildings along the south



CROSS - SECTION



LONGITUDINAL SECTION C - C

CROSS AND LONGITUDINAL SECTIONS OF TWELFTH STREET, CHICAGO, TRACK CONSTRUCTION

curbs, to 108 ft. and 78 ft. respectively. Much credit is due M. J. Faherty, president of the board of local improvements, for the speedy accomplishment of the task of co-ordinating and satisfying all the diversified interests involved in the widening of the street over a distance of  $1\frac{1}{2}$  miles, which as a main thoroughfare was occupied by all the utility companies and a great variety of commercial enterprises. The completion of this project marks the first step in the much-talked-of but long-delayed "Chicago Beautiful" plan as laid out by the Chicago Commission.

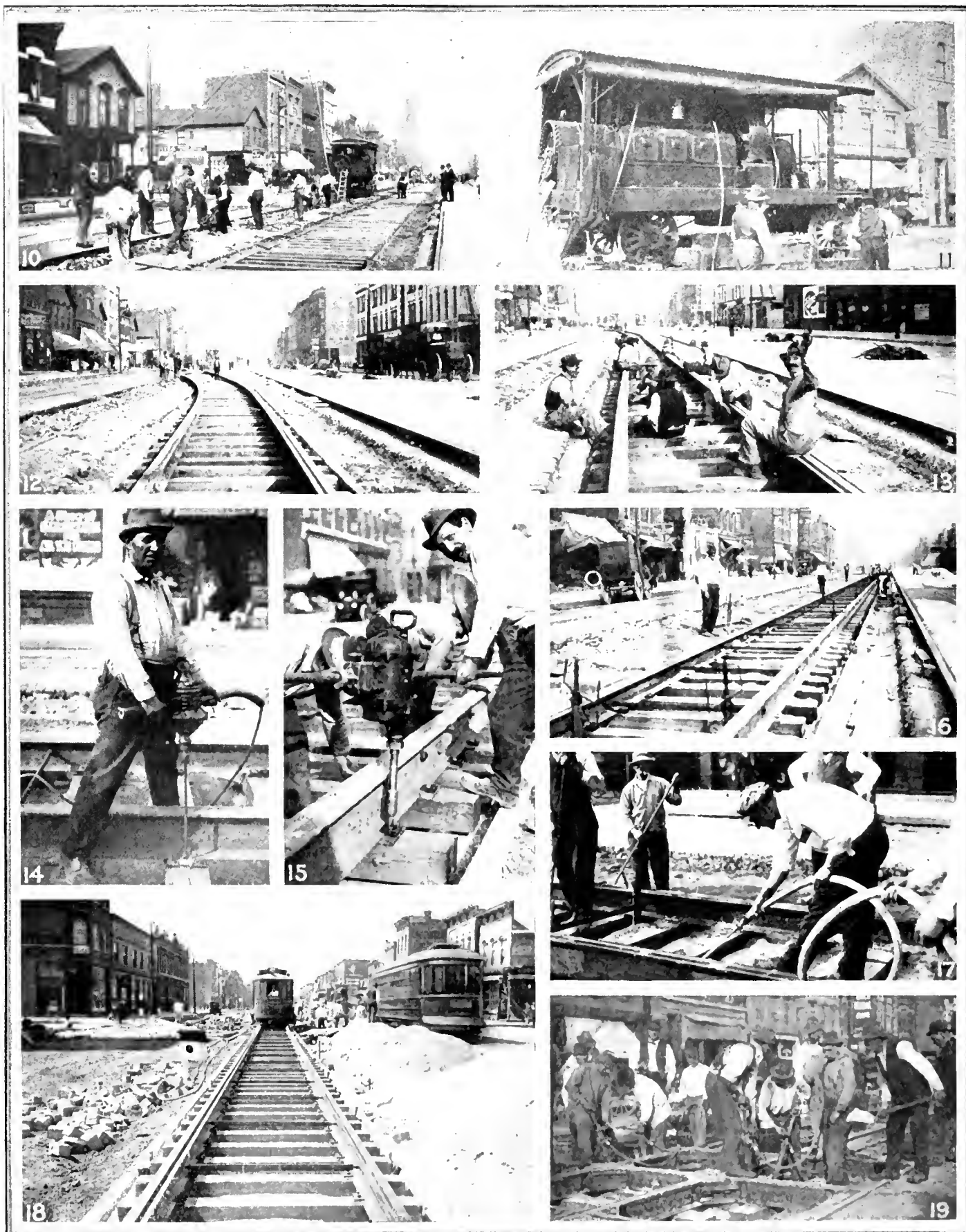
The work of the street railway company in connection with the program involved taking up and building anew 1.38 miles of double track on Twelfth Street, including seven special-work layouts, and rebuilding 300 ft. of double track on either side of Twelfth Street at each one of these seven intersections on account of the change in grade. In all, the job comprised the building of more than 3 miles of single track and was completed between the dates of July 14 and Nov. 11, with eleven days out for bad weather and six days out for delay caused by the contractors. The average number of men employed was about 210. Because other men could not be obtained the company employed many labor-saving devices to help make up the shortage and

side of the street. The curbing and sidewalk construction had been torn up and a row of open basements partially filled with debris and rubbish remained as a foundation for the new eastbound track. Preliminary to track construction it was necessary to excavate to the bottom of the old basements and to

refill them with lake sand in order to be sure of the foundation. The sand was hauled in side-dump cars originally purchased for hauling garbage for the city, dumped as near the fill as possible, and then shoveled or moved hydraulically into the holes. Wherever walls occurred that were sufficiently solid, they were not removed. While the filling-in process was going on the work was flooded to aid the settlement, and at some places planks were laid down over the trackway and the fill was compressed with a 10-ton roller. The space outside the trackway was also flooded so that the weight of the roller would force the sand into voids, as it was desired to control the foundation over a strip 10 ft. outside the right-of-way.

On the new foundation the concrete slab for the eastbound track was laid, and this construction was completed all the way through before the old tracks were disturbed. Eastbound traffic was then operated over the new track, leaving the former eastbound track free





10. Cutting away the old concrete to free the rails, and new ties ready to receive rail.

11. Shop compressors used in tamping track.

12. Prying the rail over to new track location.

13. Cleaning off the old cement on the rails.

14. Boring the screw spike holes.

15. Driving home a screw spike.

16. Track jacked up ready for tamping.

17. Wetting the tamping material and washing it under the ties.

18. Track tamped and blocked laterally in alignment ready for concreting.

19. Pneumatic tampers prove especially effective on special work.

### Photographic Description of Chicago Track Construction Methods (Continued)

for the use of work and material cars. As the subgrade construction work for the new westbound tracks progressed the rails of the old eastbound track were shifted, in good condition, over onto the new ties and foundation. Finally upon the completion of the second track, westbound car service was transferred to this and the old westbound track torn up and removed.

#### UNCERTAIN FOUNDATION MAKES BOTTOM SLAB CONSTRUCTION NECESSARY

The type of track construction used on Twelfth Street differs in some interesting ways from the Chicago standards. Deviation from the standard solid concrete track in which the ties are completely incased in concrete was thought necessary because of the uncertain character of the foundation, placed as it was over a new fill some 9 ft. deep. In view of this condition it seemed advisable to provide an assurance against sagging by building, along the right-of-way, a concrete slab on which to place the track construction. With a slab foundation it was necessary to use a certain amount of ballast in order satisfactorily to surface the track. Fine washed screenings were used for this purpose. To retain the screenings entirely under the ties or prevent them from scattering out over the roadway in tamping, the concrete foundation slab was formed with a curbing along each side. The curbs were also useful in lining up the track. Wedges were driven down between a tie end and the curb at intervals, thus holding the track exactly where wanted without danger of accidental knocking out of alignment during the concreting. The curb construction necessitated a somewhat wider base on the concrete foundation slab than the standard concrete construction provides, in order properly to support the curbing. The width was therefore increased from 7 ft. 4 in. to 8 ft. 6 in.

In respects other than those already mentioned the type of track construction used on Twelfth Street is the standard 2-A Board of Supervising Engineers construction for use in paved streets. The ties are 90 per cent heart yellow pine. The rail is 9-in., 129-lb., Lorain section No. 403, set on tie plates having a single shoulder placed at the outside edge of the rail base. The rail is fastened to the ties by screw spikes, two on the inside and one on the outside of the rail at each tie, and inserted through rail clips and through the tie plates.

The space between ties and above the screenings was filled with concrete which was carried up well over the base of the rail. On top of this a 1½-in. layer of torpedo sand, instead of the bedding sand generally used in Chicago, was spread as a cushion for the paving, which was laid with No. 1 Wisconsin granite block the full width of the trackway. This was grouted by means of a 1 to 1½ cement grout, which runs down between the blocks to make the sand a solid mass, thus sealing over the top of the entire track construction against seepage of water from above down into the interior track construction.

After the new eastbound track was completed for traffic, work was begun on the new westbound track, and this was especially interesting because of the fact that the rails of the old eastbound track were moved over and used on the new track without separating the electrically welded joints. All work on the sub-founda-

tion was therefore completed for a section, and then as the concrete mixers and work cars moved back, having been preceded by the material trains, which distributed cement, tamping material, rails, ties, rods, plates, clips, spikes, etc., the rails of the old track were freed from their fastenings and pried over.

The concrete bottom channel was first poured, using from one to three motor-driven Chicago concrete mixers delivering a ¾-yd. batch at a time and mounted on cars which were run on an adjacent portable track. The forms for this channel-shaped slab consisted of a single row of boards set on edge against stakes along the outer sides of the slab and extending up to the top of the curb, and sectional forms blocked up between these boards to form the inner sides of the curbing. The material for the slab was poured in to the full thickness and then the inner forms were put in place and the curbs poured immediately. After the concrete had set these inside forms were removed and a layer of tamping material was spread over the concrete. The ties were then laid and spaced ready for the rails.

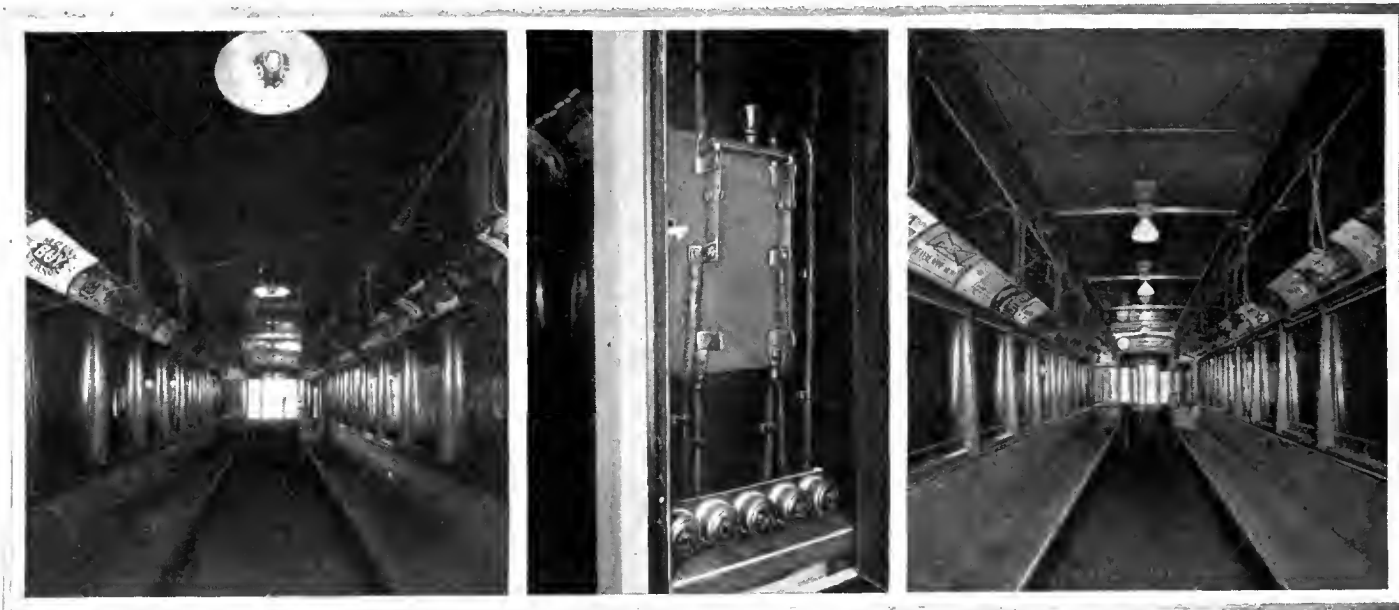
Gangs of men following the mixers as they receded from the first end of the job were engaged in tearing up the paving around the old track and in breaking out the concrete around the rails so that they might be freed from the ties. To expedite this work a spare compressor from the railway shops was loaded on a small flat car and taken to the job to supply air to eight Ingersoll-Rand pneumatic tampers fitted with special tools for chipping out the concrete. These tools were effective in removing the concrete over the base of the rail and the grouting at the web of the rail. They were also used later in tamping the ties up to grade and were found especially valuable in tamping up the new special work at the seven intersections.

#### TRACKS MOVED WITHOUT BREAKING ELECTRICALLY WELDED JOINTS

As the rails were cleared of concrete they were moved over onto the ties at the new track location. This moving process was done gradually by a gang of men who used crowbars to pry the rail over to its new position. It was possible to do this without breaking any of the Lorain welded joints. After the rail was in its new location another gang of men cleaned the rail to receive the new concrete and grouting.

The work of tearing up the old paving outside the rails in order to free the rails was greatly expedited by placing jacks underneath two or three tie rods at a time, after the inside paving had been removed. Lifting up on the jacks bent the rods up and pulled the rails toward each other and away from the outside paving, thus avoiding the necessity of removing the first row or two of blocks by hand.

As the rail was moved over to the new ties it was set to gage and the ties blocked up approximately to grade. The tie plates were then put under the rails and the holes bored in the ties to receive the screw spikes. These holes were bored by means of Chicago Pneumatic Tool Company's electric drills and the spikes screwed in with heavy No. 4 drills made by the same company. This screwed the spikes down and set them tight as the motor stalled. The spikes were driven through rail clips, two spikes and clips on the inside and one on the outside at each tie. Each spike ma-



THE OLD STYLE—FIFTEEN 23-WATT LAMPS

PANEL BOARD FOR NEW LIGHTING

THE NEW STYLE—FIVE 56-WATT LAMPS

## Reducing Car Lighting Costs from 36 Cents to 8 Cents per 1000 Car-miles

BY ARTHUR R. JOHNSON

Assistant to Superintendent of Equipment, Mechanical Department,  
Third Avenue Railway System, New York

**I**N CONNECTION with the remodeling of the Third Avenue Railway System of fifty standard 28 ft. closed cars into prepayment type for its lines in Westchester the car lighting is being changed from 23-watt to 56-watt units because of the great success of the

*(Concluded from page 611)*

chine was protected from excessive overload by a circuit breaker mounted on a pole hooked over the trolley wire to supply the power. These circuit breakers also served to start and stop the motor, and were controlled by a solenoid energized through a double push-button control at the handle of the drill.

After the rails were fastened to the ties they were jacked up to grade by means of screw jacks set about 30 ft. apart on each rail, and the additional screenings were placed between the ties and the latter tamped to permanent grade. The tamping was made more solid by wetting down the screenings and by washing them underneath the ties. This was done by directing a nozzle stream at the bottom edge of the tie. With the track thus tamped to grade and aligned, the jacks were removed and the upper concrete or paving foundation poured. This was poured from mixers operated on the track under construction. The paving was then laid as described above, and wherever the condition of the old blocks was satisfactory they were relaid, the pitch with which they were formerly bound having been thoroughly cleaned off in order that the new grouting would be effective.

All work on the improvement was finally completed on Dec. 2, which date had been set for a formal opening of the street. A considerable celebration attended by some 10,000 people and accompanied by appropriate speeches from the Mayor and other prominent city officials marked the conclusion of this important work.

larger units on the fifty low-level steel cars operated in the Borough of the Bronx. These cars, which were described in the *ELECTRIC RAILWAY JOURNAL* of Feb. 14, 1914, have five 56-watt tungsten lamps in Macbeth-Evans Alba shades along the center line of the car, as illustrated. Previously there were three five-light clusters with Benjamin shades and 23-watt lamps.

The new semi-direct system gives a well-diffused illumination. The tungsten lamps form one series circuit, the second circuit being made up of five 2-cp. lamps for the destination signs and headlights. In case a tungsten lamp burns out, the equivalent resistance can be cut in by turning the snap switch provided for each of the five lamps. These snap switches are located in a panelboard at the front of the car. The same panel carries a double-throw switch required for changing from underground conduit to overhead trolley operation.

Experience since 1914 with the equipments on the low-level cars shows that these larger units instead of costing for maintenance three-eighths as much as the 23-watt outfits as estimated actually cost less than one-quarter as much. A recent check shows that the lamp costs per 1000 miles for the past year were 36 cents on the system as a whole and only 8 cents for the fifty low-level cars alone. Only 270 lamps, or less than one lamp per day, were required for these fifty cars, which made approximately 900,000 miles.

## Kansas City Railways Active in Local N. S. C. Council

**T**HE Kansas City Railways has been one of the most helpful of active members of the local council of the National Safety Council, and its representatives at the foremen's round tables have helped to give the discussion a practical value. At the recent election of officers, George J. Smith, superintendent of rolling stock and shops, was chosen as vice-president, while Julien H. Harvey, superintendent of efficiency, has served two terms as local president. At the last council dinner there was an attendance of 420.

# Automobile Parking Chokes Washington Traffic Channels

**In This Section of His Report John A. Beeler Says Greatest Single Source of Relief to Washington Car Service Is Restriction of Parking Privileges—Other Suggestions Dealing with the Washington Railway & Electric Company Include One-Way Vehicular Traffic, Double-Berthing, Loading Platforms, Front-End Fare Collection and Rerouting**

ON MARCH 9 John A. Beeler submitted to the Public Utilities Commission of the District of Columbia his fifth unit report. This deals largely with relief measures for the lines of the Washington Railway & Electric Company. The most congested section of this railway system is in the region bounded by Ninth Street, Fourteenth Street, F Street and G Street (see Fig. 1), and in many ways the conditions here are worse than on Fifteenth and adjoining streets, discussed in the report on the Capital Traction Company, abstracted in the issue of this paper for Feb. 2. The roadways are narrower, so that many vehicles have to run on the car tracks, especially if machines are parked along the curbs. This reduces the speed of car traffic to that of the slowest vehicle on the rails and results in bunching and irregular service. Since the number of cars that can pass through this portion of the railway system determines the service that can be rendered on the remainder of the lines, schedules are very seriously deranged.

The section under consideration is the heart of the city. Here are concentrated the bulk of the retail business and the principal office buildings, many of which are now filled with government employees engaged on war work. Very little space is left for the construction of additional tracks, as the streets are well covered as it is. Through this small area is operated every city route of the Washington Railway & Electric Company, with the single exception of the Columbia line, which is but a short distance north, on New York Avenue.

In the main portion of this territory, that bounded by Ninth, Fourteenth, F and G Streets, there are twelve street corners. Six of them are electric railway crossings, and at each crossing there are one or more curves that still further complicate the special work. The effect of the track intersections is invariably to slow down the speed, since cars are now required to come to a full stop before crossing other tracks. On account of the breaks in the conductor rails inherent to the conduit system, it is necessary for the cars to proceed without power over the intersections, which not only reduces the speed but makes it inadvisable for cars to follow each other closely.

A considerable amount of parking is done by those who drive to work in the morning and leave their machines on the streets all day while in their offices. In the afternoon they drive back home, but not until the general public has been exasperated by the delays to the street cars consequent on the use of the public streets as a private garage. If a street car company were to run its cars downtown in the morning and leave them in the street until needed in the afternoon, it would not take the public long to invoke the police powers and have the company officials run out of town.

JOHN A. BEELER.

The maximum number of cars operated in one direction over each street is shown in Fig. 3. The heaviest service over any piece of track is that between F and G Streets on Fourteenth, where 107 cars are scheduled to pass one way in one hour. With a stop at G Street, a division of cars at the switch between northbound and eastbound, and the ever-present automobile traffic, the problem demands action.

Second place is accorded to the two squares on G Street between Ninth and Eleventh, where ninety-nine cars are scheduled westbound in one hour. Here the vehicle traffic is less, so that the situation is not so severe. The general traffic, however, is so great that the street cars are not all passed through on schedule time.

The large number of track intersections over which the cars in this territory have to pass has proved a serious limitation on the number of cars that can be operated over the main routes. This is indicated in Fig. 4, which shows the number of cars scheduled to pass over each intersection in this territory.

The maximum number scheduled is at Fourteenth and G Streets, where 283 are supposed to pass in one hour. Next to this is the intersection with the Fourteenth Street line of the Capital

Traction Company at Fourteenth and H Streets, where 259 cars in an hour are scheduled. The smallest number at any point in this section is at Eleventh and E Streets, where but fourteen cars are scheduled in the maximum hour.

No more cars can be run than can be passed over the crossings. It takes on an average about eight seconds

DISTANCES TRAVELED WITH 1½ M.P.H.P.S. ACCELERATION			
In the first	second	1.1 ft., total from start	1.1 ft.
In the second	second	3.3 ft., total from start	4.4 ft.
In the third	second	5.5 ft., total from start	9.9 ft.
In the fourth	second	7.7 ft., total from start	17.6 ft.
In the fifth	second	9.9 ft., total from start	27.5 ft.
In the sixth	second	12.1 ft., total from start	39.6 ft.
In the seventh	second	14.2 ft., total from start	53.8 ft.
In the eighth	second	16.4 ft., total from start	70.2 ft.

for a car to pass over an intersecting street. It is possible for two cars to pass at the same time in opposite directions, and this is done in some cases. It is ordinarily the case in Washington that each car comes to a full stop before entering the intersection. The



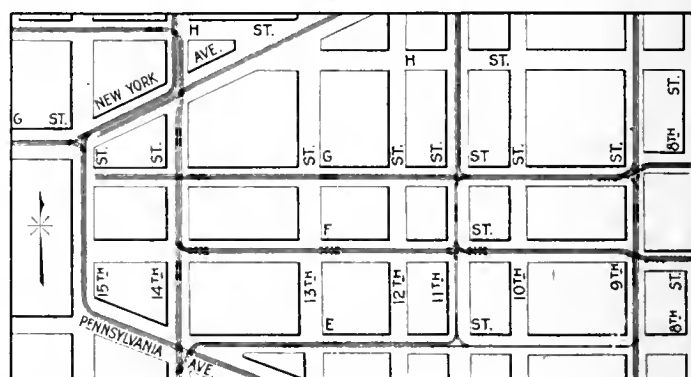
time required is then limited by the acceleration of the car. At a rate of acceleration of  $1\frac{1}{2}$  m.p.h.p.s., which is the average for this city, the car would move the distances given in the table on page 613.

In this table is an absolute limit to the speed which can be obtained in going over a crossing. This requires power to be kept on all the time while moving over the intersection. With the conduit system this is impossible, as the conductor rails are necessarily interrupted where the two tracks cross.

If ten seconds are allowed as the lowest average time for the passage of a car from the time the signal to proceed is given until the intersection is cleared, it follows that the maximum number of single-car units that can pass over a right-angled crossing is 180 for a thirty-minute period, or 360 per hour. To do this would require no waste time between cars, that every car moves with clock-like regularity, and that no breaks occur due to interference of any kind whatsoever. This virtually means that the street cars and all vehicular traffic would have to be operated over the inter-

who drive to work in the morning and leave their machines on the streets all day while in their offices. In the afternoon they drive back home, but not until the general public has been exasperated by the delays to the street cars consequent on the use of the public streets as a private garage. If a street car company were to run its cars downtown in the morning and leave them in the street until needed in the afternoon, it would not take the public long to invoke the police powers and have the company officials run out of town. In fact, the situation has been fully covered by Sec. 64 of Art. XII of the Police Regulations, which states: "A driver of a street car shall not allow it to stand upon a street for a longer period than five minutes unless the way is obstructed . . ." This is a most commendable regulation, but it seems to be a case of unconscious discrimination in favor of the automobile to allow it privileges that are denied the more public conveyance.

The result of all these delays is to interfere seriously with schedules, especially during the rush hours. The



FIGS. 1 AND 2—EXISTING AND PROPOSED CAR STOPS IN CONGESTED SECTION OF WASHINGTON RAILWAY & ELECTRIC COMPANY'S SYSTEM

sections in such a way as to co-ordinate the movements of the latter with that of the street cars. This figure represents the theoretical capacity rather than that actually obtainable.

#### CONGESTION INCREASED BY AUTOMOBILES

The streets in this territory are quite wide, F Street being 100 ft. wide and G Street 90 ft. wide. The active roadways are encroached upon by wide sidewalks of which a large proportion has been appropriated by private property owners for stairways, areas and projecting show windows. The roadway is rendered still less effective by the large number of automobiles parked at all points in this district. In several cases machines are allowed to park at an angle with the curb, which still further reduces the roadway. Even at the street corners, where the public is supposed to have a chance to board the cars, the number of automobiles is so great that it is frequently difficult for prospective passengers to reach the cars they desire to take.

The danger to pedestrians is also increased by the extensive parking. An automobile driver never knows when a pedestrian will appear from behind a parked machine; and a person who desires to cross the street or catch a car is never sure that he will reach his objective in safety.

A considerable amount of parking is done by those

cars are slowed down until they move scarcely as fast as a man can walk. The schedule speed called for on the time-table is low enough, being but 6.6 m.p.h.

On F Street the speed in the morning by fifteen-minute periods was found to vary from 6.71 down to 2.96 m.p.h., averaging about 4.6 m.p.h. for both directions. In the evening rush period the speed varied from 9.75 down as low as 2.84 m.p.h., the average being approximately 4.5 m.p.h. for all cars. The speed on G Street in the morning was fair, being 6.5 m.p.h., which was reduced in the evening to 5.5 m.p.h., the range in speeds being from 8.21 down to 3.01 m.p.h. The slightly better showing on G Street east of Fourteenth is counteracted by the speed in the block from Fourteenth to Fifteenth, where the average speed was less than 2.5 m.p.h. The maximum speed recorded in this block for a fifteen-minute period was 2.78 m.p.h. The average time required to turn a car on the cross-over, based on 154 observations, was sixty seconds.

The average speed on Ninth Street is somewhat better than on F and G Streets. The morning observations by fifteen-minute periods showed an average speed of 7 m.p.h. on Ninth Street, which, however, fell to 5.6 m.p.h. in the evening rush. Under similar conditions the speed on the Eleventh Street line during the morning rush was 5.9 m.p.h., and in the evening 4.2 m.p.h.

These average speeds may be tabulated as follows:



AVERAGE SPEED OF CARS IN MILES PER HOUR			
Line	Morning Rush	Evening Rush	
F Street.....	4.6	4.5	
G Street (East of Fourteenth).....	6.5	5.5	
G Street (West of Fourteenth).....	7.0	2.5	
Ninth Street.....	7.0	5.6	
Eleventh Street.....	5.9	4.2	

The situation is still further complicated by the variety of cars used. On F and G Streets may be seen every kind of street car, from the large center-entrance type used on the Maryland line to the small hand-brake cars that still do duty for rush-hour service on practically all the lines. Apparently no attempt has

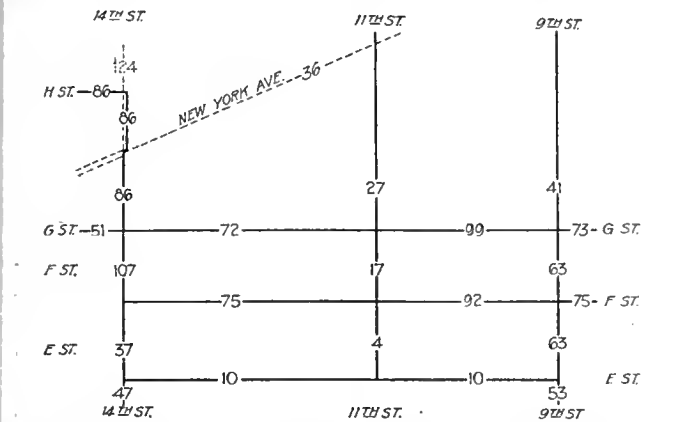


FIG. 3—MAXIMUM NUMBER OF CARS IN ONE DIRECTION SCHEDULED IN DOWNTOWN DISTRICT, WASHINGTON RAILWAY & ELECTRIC COMPANY

been made to segregate types of equipment by routes. This mixture of car types has proved wasteful, since the cost of platform labor time is increased, power is wasted because the faster cars crawl along on the resistance points of the controller, and the accommodations given the patrons are so reduced that the carrying capacity of the road is materially decreased.

MEASURES AVAILABLE FOR RELIEF

The measures which should be put in effect immediately are the following:

1. Street cars must be given precedence by the traffic officers, and must be passed over intersecting streets in pairs as far as possible, especially during the hours of congestion.
2. Parking of automobiles must be limited to permit freer movement of the street cars and to provide greater safety to the public.
3. Certain portions of the streets must be limited to one-way vehicular traffic.
4. Equipment of the company must be so distributed that, as far as possible, all the cars on one street shall be of the same general type.
5. Cars of greatest capacity and highest speed must be used on the principal routes, and the slower and smaller cars transferred to the less congested lines.
6. Stopping places must be combined and reduced to the smallest number that will accommodate the public properly.
7. Double berthing must be employed at all the stops in this territory.
8. Loading platforms must be provided where they can be used to advantage; at the other stopping places zones of safety must be provided.
9. Front-end collectors must be employed at the stops in this territory wherever the car type is suit-

able; at other points inspectors should aid in loading the cars.

10. A rerouting of the cars in this region should follow as soon as practicable. This will be considered in detail in a section of this report to follow.

1. *Precedence for Street Cars.* The cars must be given preference by the traffic officers at all intersections in this territory. By passing cars in pairs the movements will be facilitated and congestion reduced to a minimum. As at other points already referred to in the first unit report, the officers should endeavor always to keep the near-side berths empty and the far-side berths filled. If the track clearance on curves is such that cars of certain types cannot pass safely the officers should be well informed of the fact and should make due allowance in their actions governing the movement of cars.

2. *Parking of Automobiles Limited.* Parking of automobiles interferes seriously with the movements of cars in this congested territory. It is recommended that no parking be allowed on F and G Streets between Ninth and Fourteenth Streets, and on Ninth Street between F and G Streets, and that automobiles be required to proceed through the streets, draw up parallel with the curb, and receive or discharge passengers only. Commercial vehicles should be allowed to stand in front of stores only long enough to transact legitimate business.

3. *One-Way Vehicular Traffic.* It is also recommended that F Street between Seventh and Ninth be closed to westbound traffic, that G Street between Seventh and Ninth be closed to eastbound traffic, and that Ninth Street between F and G be closed to northbound traffic. This should apply to all vehicles except those having business with the Patent Office, which is the only building within this boundary, and which is served principally by the entrance on Seventh Street.

4. *Segregation of Types of Equipment.* The Washington Railway & Electric Company has no one type of

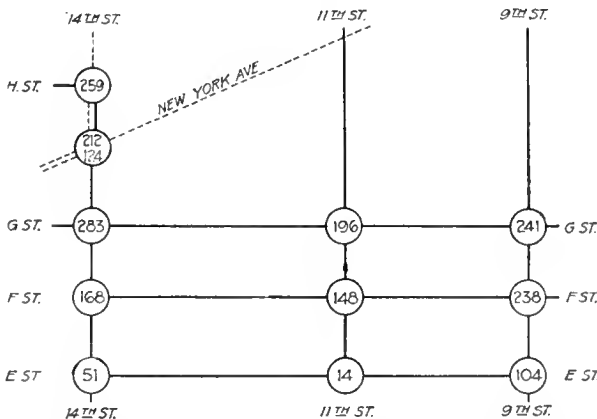


FIG. 4—CARS SCHEDULED TO CROSS INTERSECTIONS BETWEEN 4.30 AND 5.30 P.M.

car that can be called standard. There are, however, several types of which the company owns a considerable number. These are the center-entrance, the pay-as-you-enter, and the old-style open platform box cars. Sufficient cars of each of these types are in service completely to equip various lines with a single type. This will make it possible to speed up all lines except those on which the slowest cars must be placed. All cars

running to the Bureau of Engraving should be of the prepayment type, as otherwise it is not possible for the conductor to collect all the fares in a crowd before reaching the downtown section where most of the passengers transfer to other lines.

5. *Suitable Equipment for Various Routes.* The routes with the heaviest travel should be operated with the largest and fastest cars on the system. It is desirable to use the same type of car on both the Connecticut Avenue and the Georgetown lines, so as to make the equipment entirely interchangeable. The most suitable car for this line is the center-entrance type. This is largely due to the fact that it is the only type (except the hand-brake car) of which there are sufficient to completely equip these lines.

6. *New and Fewer Locations for Stopping Places.* The number of stops can be materially reduced without in any way discommoding passengers, and in most instances it merely makes the difference between stopping on one side of the street or the other. The proposed locations for stopping places in this area are shown in Fig. 2. The total number of stopping places in the area considered will be reduced by their change from fifty-two to thirty-two, saving twenty or 38 per cent.

7. *Double Berthing.* Double berthing must be employed at all these stops in order to get the maximum benefit from the change. The double berthing must be used at all times of the day and night. In every case the car must take the first berth if empty. If not, there should be no hesitation, but the car should be stopped promptly at the second position.

8. *Loading Platforms and Safety Zones.* The streets in this area are comparatively narrow, and it is impossible to obtain sufficient width for loading platforms at all points. However, they must be constructed, and it is essential to have them, at the following places:

Fourteenth Street, midway between G Street and New York Avenue, for both directions.  
F Street at Fourteenth, for both directions.  
F Street at Thirteenth, for both directions.  
F Street at Eleventh, for both directions.  
F Street at Ninth, for both directions.  
G Street at Ninth, eastbound.  
Ninth Street, midway between F and G Streets, northbound.

The platforms should be about 10 in. high and 96 ft. long, which will accommodate two cars of the longest types in use on any of the company's lines. The width should be 4 ft. 6 in. for all except those on Fourteenth Street, which can be 6 ft. wide. It is considered advisable to maintain a width of roadway sufficient to allow the passage of two automobiles side by side, which requires approximately 13 ft. as a minimum. To keep traffic moving it is not considered desirable to have the roadway quite so narrow. To facilitate vehicle movement, the platforms could have the corners away from the track rounded off or beveled. This will prevent danger from collisions of vehicles with the platform. The standing limit for automobiles (there being no parking) should also be moved back a sufficient distance from the platform for a moving vehicle to swing in an easy curve to the roadway between the platform and the curb, instead of having to make a sharp turn between a standing vehicle and the platform.

9. *Front-End Collection.* Comparatively few of the cars of this company have been used with prepayment of fares and few are equipped with doors which can

be kept closed while the cars are in motion. The center-entrance type, which is the largest prepayment car used by this company, has only a single door, so that a separate collector on the street could not help in collecting fares from passengers as they board the cars. An inspector on the loading platform could, however, aid materially in loading by holding back entering passengers until those leaving are all out and by assisting passengers, as in providing tickets and change, before the arrival of the car.

While it will be comparatively difficult to modify the open platform cars to make them into the regular prepayment type with inclosed platforms, it will be quite simple to prevent passengers from entering the cars at the front end. This can be done by issuing instructions to the motormen, and with the co-operation of the public it should not be difficult to use the front platform for exit only. As a matter of safety, passengers should not be allowed to ride on the front platform.

The use of the rear platform as the only regular entrance to these cars will make it possible for the company to use them with a modification of the prepayment system, so that the conductor will always remain at the rear entrance, and collect the fares as the passengers board the car. This will aid in keeping the cars moving, as the conductor will always be in a position where he can see the rear step and know whether it is safe for the car to proceed. It will also tend to reduce accidents, as the conductor will be where he can supervise to a certain extent the movements of boarding passengers.

Another advantage of this arrangement is that in the congested zone front-end collectors can assist in loading the cars by standing on the loading platform or in the safety zone and collecting fares from passengers entering the car by the front door. Frequently these front-end collectors will also be able to assist in loading passengers at the rear entrance, as a man on the street can assist in directing the movements of persons entering or leaving the cars better than the conductor.

On all closed cars, except on interurban cars where special compartments are provided, smoking should be prohibited. The rear platform should be kept clear for the ingress of passengers. This is in keeping with the best modern practice.

10. *Rerouting Desirable.* Apparently the lines of this company are not so arranged as to give the best possible service to all parts of the city which are included in its territory, especially when non-competitive. In order to accommodate all districts to the best advantage, considerable rerouting is desirable so that some sections now under-served will receive a proper proportion of the available transportation facilities. To obtain relief immediately, it is recommended that the first nine items be adopted without waiting for the more comprehensive treatment necessary in considering a rerouting plan. Rerouting possibilities will be presented in sections of the report to follow.

#### RESULTS TO BE OBTAINED

The results to be obtained in the proposed immediate changes are very similar to those described in the first unit report. An increase in speed in the congested region should follow at once. This in turn will have

## Rate-Making Is a Sovereign Power

**Oregon Circuit Court Unanimously Rules That the State Through the Public Service Commission Can Change Rates Set in Municipal Franchises**

BY A UNANIMOUS vote the six circuit judges of Multnomah County, Ore., sitting *en banc*, handed down on March 14 a decision upholding the right of the Public Service Commission to grant a 6-cent fare to the Portland Railway Light & Power Company. The sole question involved was the power of the commission to raise rates prescribed in franchises.

The history of the 6-cent fare in Portland dates from last autumn, when the company petitioned for increased revenues. A 6-cent fare was then denied, although partial financial relief along other lines was granted [ELECTRIC RAILWAY JOURNAL, Oct. 27, 1917, page 757]. The commission later granted a rehearing and in January, 1918, approved a 6-cent fare [ELECTRIC RAILWAY JOURNAL, Jan. 26, 1918, page, 184]. In February the city of Portland brought suit against the company and the commission, alleging that the latter had acted illegally.

### STATE HAS RATE-FIXING POWER

In now upholding the commission's decision the Circuit Court begins with the statement that the power to establish fares for the transportation of passengers by common carriers is a sovereign power of the State. The State may not entirely denude itself of this power. It may delegate, but it cannot abdicate. It may delegate to a municipal corporation authority to grant a franchise upon the streets and establish an unalterable rate fare for the limited duration of the franchise, but such authority can be delegated only by express grant or clear intention. (Woodburn *vs.* Public Service Commission, 82 Ore. 114; Stanilaus County *vs.* San Joaquin, etc., Canal, etc., Company, 192 U. S. 201; Howe Telephone Company *vs.* Los Angeles, 211 U. S. 265; Milwaukee Electric Railway *vs.* Railroad Commission, 153 Wis. 592, No. 238 U. S. 174.)

With this doctrine so clearly and finally established, the court says, it remains to be considered whether the Legislature has delegated sufficient authority to the city of Portland to execute an inviolable contract for rates of fare. By Sec. 94 of the charter of 1903 the city is authorized to grant for a limited time franchises in its streets and public ways. Sec. 112 reads as follows:

Every grant of a franchise which provides for this charging of rates, fares and charges shall contain a pro-

vision fixing the maximum rate of fares, rates and charges which the grantee, his, its or their successors or assigns can charge or collect for services rendered or performed by virtue of or during the life of such franchise and the operation of his or its plant or property thereunder; and said grant may also in addition provide that the council reserves the right to thereafter from time to time change, alter, regulate and fix fares, rates or charges which the grantee, his, its or their successors or assigns can charge or collect thereunder during the life of such grant or franchise.

Under these charter provisions the city granted the franchises of the Portland Railway, Light & Power Company. Each franchise contained a provision, in substantially identical terms, that the grantee could collect 5 cents and no more for each passage in one general direction. Provision for the regulation of fares by the Council was omitted from practically all of the franchises. Did the State by this delegation surrender its power of regulation?

The Circuit Court thinks not. The only reference to rates is in Sec. 112, and this is not a grant of power to fix an unalterable rate, as against the State, but is a limitation on the power of the city to grant franchises without fixing the maximum rate of fares therein. In Portland Railway, Light & Power Company *vs.* City of Portland, 210 Fed. 119, Judges Bean and Wolverton of the Federal Court construed these very provisions, in these words:

Sec. 112 of the charter does not in terms or by necessary implication authorize or empower the city to enter into an irrevocable contract with the grantee of a franchise fixing the rates of fares which may be charged by such grantee. . . . [The section] is in the nature of a command from the supreme legislative power of the State to the city that it shall, in granting franchises which provide for a charge of fares, insert a provision fixing the maximum charges which the grantee or its assigns may charge or collect for services rendered during the lifetime of the franchise. It is a limitation rather than the grant of a power to contract or barter away the governmental right of regulating fares, . . . and the fact that no provision was entered in the franchise reserving to the city the right to change the rate cannot affect its power to do so.

### STATE IS IMPORTANT FACTOR IN SUIT

The court considered with care two cases upon which much reliance was placed by city counsel, Detroit *vs.* Detroit Street Railway, 184 U. S. 368, and Cleveland *vs.* Cleveland Electric Railway Company, 194 U. S. 538. These were cases, the court remarks, in which the city was attempting to regulate rates, and the State was not a party. In certain situations the rate provisions of a franchise might be binding between parties, and neither of the immediate parties could alter the rates, but the State might regulate them in the exercise of its sovereign power. The Oregon Supreme Court evidently had this line of decisions in view when it said in Woodburn *vs.* Public Service Commission, *supra*:

It must be borne in mind throughout the discussion of this case that the State, acting through its Public Service Commission, is a party to this suit, and consequently judicial precedents arising out of controversies between none but the immediate parties to a franchise are not controlling here. Moreover, the present juncture does not call for a decision of the relative rights of the grantor and grantee of the franchise as between themselves.

The court concludes, therefore, that the State did not surrender its sovereign power to regulate rates by its grant of franchise powers in the charter of 1903; that the delegation is not sufficient to extinguish the power of the State to alter these rates; that the immediate parties to the franchise contracted in this rela-

(Concluded from page 616)

the effect of passing more cars through the downtown area in a given time. Higher speed will in turn increase the amount of service in proportion, and also make the movements safer and more agreeable to the public, particularly in the material reduction of crowding, because the same number of cars will make a greater number of trips.

Even so inexpensive an innovation as the raised loading platform is of material benefit to the public in making it safer to board the cars, besides affording a convenient place to stand out of the wet and slush of inclement weather.

## A. R. E. A. Approves Reports

An Abstract of Results of Discussion at Chicago Convention of Special Interest to Electric Railway Men Is Given

AT THE annual convention of the American Railway Engineering Association held last week at Chicago recommendations of fourteen of the committees were adopted. Abstracts of the reports of a number of these were printed in the issue of the ELECTRIC RAILWAY JOURNAL for March 23, page 565; that on stresses in railroad track is given below.

A large part of the time devoted to the paper on ballast was taken up with a moving picture of the Ingersoll-Rand pneumatic tamper at work. The purpose of the picture was to show the labor saving which results from the use of a device of this sort. The only extended discussion on the recommendations of the committee on ballast was over the adoption of a specific section calling for 24 in. of ballast. A standard section for 24-in. depth of ballast was, however, adopted, not for the purpose of stipulating that 24 in. of ballast should be used but that where such depth is used the standard should be followed.

The chairman of the committee on ties suggested

*(Concluded from page 617)*

tion with the view that the State might later intervene and regulate the rates to meet new and changing conditions, and the rate provisions of the contract do not constitute inviolable contracts, binding upon the State.

In disposing of other contentions of the city of Portland, the court notes that Sec. 2207 of the State laws prohibits under penalties any street railway in cities having a population of more than 50,000 from charging a fare of more than 5 cents within the corporate limits. This law, general in terms but local in its operation, was enacted in 1901. The court believes that it has been repealed by necessary implication by the public service law, just as this act amended or superseded all municipal charters of the State in conflict with its provisions. The public service act embraces the whole subject of rates for public service, and it was the plain purpose of the framers to give expression to the whole law therein.

Whether the public service act is retrospective, or prospective only, is a question of construction. In the court's opinion, the act was plainly intended to embrace antecedent rate contracts. The language of the act itself, various provisions contained therein, the history of its introduction and passage by the legislative assembly, as well as the extended discussion before its ratification by the people under the referendum, all indicate that purpose and intention. The valuation of all public utilities, the submission of reports, the schedules of rates required to be filed with the commission, with the practical construction placed upon the act by the officers charged with the duty of executing its provision, are persuasive reasons for this conclusion. Moreover, this statute has been construed to be retroactive in the state of its origin. (*President and Trustees vs. Southern Wisconsin Power Company*, 135 N. W. 504; *Manitowoc vs. Manitowoc & Northern Traction Company*, 129 N. W. 929; *Woodburn vs. Public Service Commission*, *supra*.)

that as the report of the committee consisted entirely of recommendations and information rather than any definite plans to be adopted, the committee make no report at this time but continue for another year. This suggestion was followed. Specifications were adopted for quenched carbon and carbon alloy steel joint bars, to be substituted for the specification for heat-treated oil-quenched steel joint bars now in the Manual. Specifications were also adopted for quenched carbon alloy steel track bolts and nuts, and for medium carbon steel track bolts and nuts, to replace the existing specifications for track bolts. The committee's recommendations regarding the location for physical test specimens and of chemical sandals from rails were accepted. With certain slight modifications also, the ten conclusions relative to the drainage of roadway through station and yards were adopted.

On the subject of signs, fences and crossings recommendations specifying the dimensions of flangeways were adopted as were conclusions relative to concrete fence posts. One conclusion adverse to the use of concrete posts in the general vicinity of salt water was referred back to the committee. Photographs illustrating different types of fences were approved for the purpose of supplementing matter now in the Manual.

The recommendations of the committee on track with respect to certain changes in the Manual were accepted and a design for cut track spikes was adopted.

### PROGRESS REPORT ON STRESSES IN RAILROAD TRACK

This report was presented by a joint committee of the American Railway Engineering Association and the American Society of Civil Engineers and is being presented simultaneously to each society. Owing to its volume, it occupying nearly 200 pages of the Bulletin, only a brief résumé can be given here. It presented the results of study and experiment extending over a period of more than four years. These tests show that rail stresses are reduced by solid and rigid roadbed construction, by deep ballast, by heavy rail and by thorough tamping. Thousands of measurements of track depression and rail stresses were made, under both standing and moving loads. As a whole they demonstrate that railway track is an elastic structure, acting in accordance with Hooke's law and thus susceptible to exact engineering treatment. More specifically, various practical facts were brought out, among them the following:

1. The span between ties does not govern the stresses in the rail, these being determined by the general track depression.
2. Both rail stress and track depression increase in direct proportion to the load.
3. Both rail stress and depression are least for well-ballasted roadbed and greatest for poor roadbed; stone ballast is better than cinders and deep ballast better than shallow ballast. Thorough tamping reduces deflections and stresses.
4. Rail stresses are less in heavy rail than in light rail.
5. A train produces higher rail stresses at high speed than at low speed; the increase may exceed 50 per cent.
6. The stress in the outer flange of the rail generally is much larger than that in the inner flange. The rail is subjected to a certain amount of transverse bending.



# Public Utility Situation Outlined

**Regional and State Committees Appointed and General Condition of Public Utilities Described in Statement Just Issued by National Joint Committee—Utilities Willing to Bear Their Share of War's Burden, but in Interest of Nation They Should Be Kept in Condition to Render Good Service**

**T**HE national committee on public utilities, with headquarters at 957 Munsey Building, Washington, D. C., has just issued a statement describing the public utility situation under war conditions. Copies of this statement have been sent to the branch regional committees representing the War Board of the American Electric Railway Association and the other associations concerned, so that they will take steps to bring this matter to the attention of the public. A copy of the statement follows:

A committee representing the American Electric Railway Association, the National Electric Light Association, the American Gas Institute and the National Commercial Gas Association, and consisting of Philip H. Gadsden, E. K. Hall and H. H. Crowell, has brought to the attention of the government officials at Washington the condition and needs of the public utility industry, with the result that President Wilson, Secretary McAdoo and Comptroller of the Currency Williams have all publicly expressed their concern as to the situation and have urged, in the interest of the national program, that state and local authorities take such steps as may be necessary to assist the utilities in preserving their credit and their service. These utterances of the President and his associates have been printed in pamphlet form and widely distributed.

The officers of the national associations believe the reasons that actuated those government officials in sounding a public warning of the necessity for liberal and sympathetic treatment of utilities should be brought to the attention of regulatory commissions and local authorities by the national associations interested, not from the standpoint of any particular corporation or utility and not affecting the interests of any one company or group of companies, but solely with regard to the broader national interest involved and the relation of the utilities to the general war program and the whole financial structure. Something more than the preservation of these utilities themselves is at stake.

The prompt and successful mobilization of men, money and materials, essential to the winning of the war, is predicated upon a continuous and constantly extending provision of light, heat, power and urban and interurban transit facilities in every section of the country. The services which in ordinary times were a local convenience have become in this period of universal stress a national necessity.

The average person never stops to think that if the services of the public utilities throughout the country should stop, the whole war program would instantly collapse. It follows that in so far as the efficiency of the public utilities is impaired the war program is proportionately delayed and interfered with.

While new construction and extensions will, during the period of the war, be held down to necessary requirements, it is absolutely impossible to refuse arbitrarily to make any additions or extensions. The direct war program or the general welfare of the public will require in most sections of the country some additional service. This, of course, requires funding of extensions to plant which can only be consummated by the rehabilitation and preservation of the credit of the utilities. The rapidly rising line of increasing operating costs has in some instances already crossed the horizontal line of inflexible rates—rates that were fixed on a pre-war basis and that are totally inadequate to meet existing conditions.

The securities of public utilities have long been a favorite form of investment for both small and large investors, savings banks, insurance companies and trustees, and are to be found as collateral for loans in every national and state bank. Their depreciation accordingly threatens the whole financial structure. If relief cannot speedily be had and the companies are forced generally to adopt the

practice of suspension of dividends, the nation's ability to subscribe for Liberty Bonds, and one of the government's chief sources of supply for income taxes, will be seriously diminished. Paul Warburg of the Federal Reserve Board recently stated before the Senate finance committee that it would be most serious for the nation's financial program if the corporations should be forced to suspend payment of dividends.

The conclusion reached by the officials of the government, in Washington, from their study of the situation, was that the really fundamental solution of the problem lay in a speedy increase of rates to absorb the increased costs of doing business, brought about by war conditions. It is equally clear that they were satisfied that the ordinary procedure for an increase of rates was utterly inadequate to meet the emergency.

It is the belief of the national associations that if the general public utility situation can be presented to the state commissions, and municipal authority along the same general lines on which it was presented to the authorities in Washington, that they must inevitably come to the same conclusion. Accordingly, the national associations are undertaking to have the general public utility situation brought to the attention of the state commissions and municipal authorities in conferences entirely dissociated from any individual rate case, in the hope that the matter of increased rates may be approached from the broad point of view of the vital general public and community interest and the interest of the nation itself, rather than solely from the viewpoint of a controversy between a local utility and its patrons.

To bring the question before the local authorities from this point of view it was thought that it would be effective to have it presented by representative committees in each state acting for and in behalf of the national associations.

The national associations have asked P. H. Gadsden, E. K. Hall and H. H. Crowell, the committee which represented the associations in Washington, to take charge of this work and to organize regional and state committees throughout the country for this purpose. Such committees have already been formed.

Apparently several of the commissions do not realize that the whole principle of regulation is now receiving its supreme test. If it is found to be too inelastic to respond promptly to abnormal conditions, it will have failed to justify its existence. It is vastly more important that the regulatory system should demonstrate its ability to preserve the efficiency and comprehensiveness of the service, than it is to demonstrate that it is able to prevent, here and there, an occasional exorbitant rate, all of which have long ago been corrected.

Everyone will agree that no public utility ought to make any additional profit by reason of the war, but this is an entirely different proposition from the suggestion that their profits should be cut during the war. Utility profits at all times are limited to a reasonable return on the investment. Anything less than that becomes permanent loss, for it can never be recouped from profits always limited to a reasonable return. The result is sure to be impairment of utility credit and reduction in the efficiency of its service.

If a utility's "assuming its share of the burdens of the war" means that officers and employees of public utilities must furnish more service with less facilities and equipment to work with than under normal conditions; that they must find a way to continue these services, notwithstanding increasing costs of materials and labor; that they must work harder to overcome extraordinary obstacles and handicaps in order to accomplish more than ever before, then of course the public utilities should bear their share of the burdens of the war, and they are doing it now and will continue to do it gladly. But if it is intended to suggest that the utilities should furnish these services at less than the cost of production and that these services should in part be rendered gratuitously, this is asking them to carry more than their fair share, it is neither just nor in the public interest, for the result must be impairment of credit,



shrinkage of value and securities, reduction in dividends and a consequent reaction upon the many thousands of investors holding these securities, which will diminish their capacity to subscribe for government loans and ultimately threaten the foundations of the general credit structure of the entire country.

#### REGIONAL AND STATE COMMITTEES

Announcement has also been made in Washington of the appointment of the regional and state committees of the National Committee on Public Utility Conditions, the functions of a regional committee being to appoint a committee for each state in its district. The names of the members of the regional committees and the chairmen of the state committees already appointed follow:

#### REGIONAL COMMITTEES

**I—Maine, New Hampshire, Vermont, Massachusetts and Rhode Island.**

\*H. G. Bradlee, Stone & Webster, Boston, Mass.; C. L. Edgar, Edison Electric Illuminating Company, Boston, Mass.

**II—New York, Pennsylvania, Connecticut, New Jersey and Maryland.**

\*J. K. Choate, J. G. White Management Corporation, New York City; T. N. McCarter, Public Service Corporation of New Jersey, Newark, N. J.; C. M. Cohn, Consolidated Gas, Electric Light & Power Company, Baltimore, Md.

**III—Ohio, Michigan, Indiana and Illinois.**

B. I. Budd, South Side Elevated Railroad, Chicago, Ill.; \*H. H. Crowell, Michigan Railway, Grand Rapids, Mich.; F. W. Coen, Lake Shore Electric Railway, Sandusky, Ohio.

**IV—Wisconsin, Minnesota, South Dakota, Iowa, Nebraska, Kansas and Missouri.**

P. J. Kealy, Kansas City (Mo.) Railways; William Chamberlain, Brown, Chamberlain & Hanselk, Cedar Rapids, Iowa; \*James D. Mortimer, North American Company, New York City.

**V—Utah, Colorado, Idaho, Wyoming, Montana, Washington and Oregon.**

F. T. Griffith, Portland Railway, Light & Power Company, Portland, Ore.; \*M. H. Aylesworth, Utah Power & Light Company, Salt Lake City, Utah; G. W. Talbot, Pacific Power & Light Company, Portland, Ore.

**VI—California and Nevada.**

\*J. A. Britton, Pacific Gas & Electric Company, San Francisco, Cal.; Paul Shoup, Pacific Electric Railway, Los Angeles, Cal.

**VII—Virginia.**

\*George J. Seay, Government Federal Reserve Bank, Fifth District, Richmond, Va.; B. B. Ferguson, Portsmouth (Va.) Gas Company; J. W. Hancock, Lynchburg Traction & Light Company, Lynchburg, Va.; T. S. Wheelwright, Virginia Railway & Power Company, Richmond, Va.

**VIII—Georgia.**

R. C. Congdon, Atlanta (Ga.) Gas Light Company; John S. Bleecker, Columbus (Ga.) Electric Company; \*P. S. Arkwright, Georgia Railway & Power Company, Atlanta, Ga.

\*Asked to assume responsibility of organizing committee.

#### CHAIRMEN OF OTHER STATE COMMITTEES

**Alabama**—J. S. Pevear, Birmingham Railway, Light & Power Company.

**Arizona**—R. G. Arthur, Douglas Traction & Light Company.

**Arkansas**—C. J. Griffith, Little Rock Railway & Light Company.

**Delaware**—T. W. Wilson, Wilmington & Philadelphia Traction Company.

**Florida**—C. I. Day, Southern Utilities Company, Jacksonville.

**Hawaii**—L. T. Peck, Honolulu Rapid Transit Company.

**Kentucky**—Donald McDonald, Louisville Gas & Electric Company.

**Louisiana**—D. D. Curran, New Orleans Railway & Light Company.

**Mississippi**—H. E. Brandli, Meridian Light & Railway Company.

## Connecticut Six-Cent Fare Is Reasonable

**Commission Denies Preferential Fare to City of Hartford—Says Modified Zone System Would Require Careful Investigation**

A 6-CENT fare is not excessive or unreasonable for the Connecticut Company, New Haven, Conn. Such is the finding of the Public Utilities Commission, handed down on March 23. The plea of the city of Hartford for the restoration of the old 5-cent fare has thus been denied.

On Oct. 1, 1917, after an announcement made ten days before, the Connecticut Company increased its unit fare from 5 to 6 cents on all sections of its 503-mile system. This action was taken under the commission law, which permits utilities to modify company-made rates subject to commission review upon complaint. The city of Hartford petitioned for relief from the new rates, and its allegations formed the sole basis for the case now decided.

#### NOT NECESSARY TO FIX RATE OF RETURN

In its analysis of the situation the commission states that the question of the valuation of the company's property as a whole loses its importance because the present rates are not producing sufficient revenue to pay any dividends. Moreover, the question of a proper rate of return is not material or necessary for the commission to determine in this case, as the minimum rate of return, without being confiscatory, on a most conservative valuation of property as a whole, would be considerably more than the present fare will produce.

The city of Hartford conceded that the company as a whole should receive more revenue than that obtained under the old rates, but it asserted that its lines and those extending from it should be treated independently. The commission states, however, that during the exhaustive hearings no facts were shown which would warrant a finding that any particular division or municipality, or combination of divisions or municipalities less than that involving the whole system, should bear all the burden of producing the necessary increased revenue, or that any particular division or municipality should be relieved from bearing its share of such a burden.

In discussing further the unity of the company's system in rate-making, the commission says:

"If the lines in the city of Hartford were to be segre-

**New Mexico**—W. S. Townsend, Las Vegas Transit Company.

**North Carolina**—R. L. Lindsey, Durham Traction Company.

**North Dakota**—R. B. Griffith, Grand Forks Street Railway.

**Oklahoma**—J. W. Shartel, Oklahoma Railway.

**Philippine Islands**—C. N. Duffy, Manila Electric Railroad & Light Corporation.

**Porto Rico**—O. M. Sewall, Porto Rico Railway Light & Power Company, San Juan.

**South Carolina**—William Elliott, Columbia Railway, Gas & Electric Company.

**Tennessee**—T. H. Tutwiler, Memphis Street Railway.

**Texas**—L. C. Bradley, Stone & Webster Management Corporation, Houston.

**Washington, D. C.**—Howard Reeside, Washington Gas Light Company.

**West Virginia**—J. O. Watson, Monongahela Valley Traction Company, Fairmont.

gated and an accurate account of each could be obtained, it would undoubtedly show that certain lines could be operated even on a 5-cent basis at a substantial margin of profit, while others would be operated at a loss. If all the lines in Hartford were to be segregated from radiating and contributing lines, it might show that the Hartford city lines with the traffic from radiating and contributing lines could be operated at a profit on a 5-cent unit of fare. But the present volume of traffic on the city lines, as well as the general business of the city, is more or less dependent upon the traffic brought in over the suburban and contributing lines, and any segregation of parts or radical differentiation in rates would detrimentally affect the social and economic structure upon which all the co-related communities were developed.

"It is unquestionably true that in the electric railway development of Connecticut, certain remote and isolated lines and extensions were built which are not and never have been self-supporting, but which are connected with and form a part of the company's present system. If these lines were to be segregated and made entirely dependent upon their own produced revenue, the rates for the limited service thereon would have to be so high as to be prohibitive, and abandonment would necessarily follow. Electric railways have been important factors in the commercial and industrial development of Connecticut, and the abandonment of some of the remote and unprofitable lines would be a very serious loss to the territory thus served, and a step backward in the general development of the State.

"Hartford and its suburban adjoining and contributing sections are not dissimilar in electric railway conditions from other populous centers in the company's territory and their respective suburban adjoining contributing sections, excepting that Hartford, under an ancient agreement, has the benefit of 2 per cent of the gross receipts of fares received within the city limits."

#### MODIFIED ZONE SYSTEM WOULD REQUIRE STUDY

The present fare system of the company is based upon a 6-cent unit fare for sections of varying length, longer rides being allowed in the more densely populated localities. The city of Hartford attacked this system as inequitable and urged that if the elimination of the present system in the populous centers, as Hartford, is impracticable, the city zone should be contracted with outer limits of equal radius from the recognized center, the charge therein to be the 5-cent unit of fare, and that traffic outside of such zone should be carried either on the present zone system, rearranged, or on a mileage basis.

In regard to this proposal the commission says:

"No traffic figures were produced from which it could be determined how much increased revenue, if any, such a plan would produce. Its general adoption, however, would eliminate the populous centers and relieve the larger number of electric railway passengers from sharing the burden of producing the necessary increased revenue, which would then have to fall upon the comparatively few.

"However defective the present long-established system may be, any radical change therefrom should not be adopted without careful study and analysis of traffic and other railway conditions on the particular lines and system to be affected. This is a practical though somewhat

complex economic problem which the transportation company itself, with its experts and intimate knowledge of operating conditions, should primarily solve.

"If the solution is to be made by the commission or any mandatory order issued by it, changing the present system to a mileage system, a combination of mileage and zone system, 'service-at-cost' system or any other system, it could only be done after a careful investigation such as has not been made and could not have been made upon the facts presented in this case. We must, therefore, at this time determine the reasonableness of the rates complained of as levied and collected on the system used by the company."

#### PAVING OBLIGATION IS HEAVY

The commission remarks that with an estimated increase of 10 per cent or \$904,682 in passenger revenue the company has not reached a solution of its troubles. It adds that the company's statutory obligation to maintain streets and highways is very heavy.

In regard to war burdens, the commission feels that these should be equitably distributed. In its opinion, the added burdens should be borne in part at least by the stockholders as a patriotic duty, as well as by the patrons. That which in normal times would be a fair return in the way of dividends for capital invested, might in war times cause an unequal distribution of the burdens in favor of the stockholders. On the other hand, rates of fare which in normal times would be reasonable, might in war times be unreasonably low, thereby causing an inequitable distribution of the burdens in favor of the patrons. The commission concludes, therefore, that any rate established under war time conditions and influenced by such conditions should be the subject of review as soon as such conditions cease to exist.

#### Digest of B. of S. Electrolysis Bulletin

SAMUEL S. WYER, consulting engineer, Columbus, Ohio, has prepared a digest of the publications of the United States Bureau of Standards on electrolysis of underground structures caused by stray electric current. The digest is divided into nine parts with the following titles: (1) Cause and Economic Importance of Electrolysis Troubles. (2) Electrolysis Surveys. (3) Corrosion Principles. (4) Relation of Soil Characteristics to Electrolysis. (5) Electrolysis of Concrete. (6) Current Leakage. (7) Mitigation Applicable to Pipes. (8) Mitigation Applicable to Railway Negative Return. (9) Electrolysis Regulation. The digest is well indexed and forms a pamphlet of nearly 100 pages. Copies can be obtained from the Bureau of Standards, Washington, D. C.

#### Bituminous Coal Mines Doing Better

The latest weekly report of the United States Geological Survey shows that the present rate of output of bituminous coal is considerably above the rate at this time last year. While there was a decline of 579,000 tons during the week ended March 16, the rate of production per working day during that week was 1,781,000 tons, the first time in five weeks during which the production per working day fell below 1,800,000 tons. The average during March, 1917, was 1,729,000 tons.

# Public Service Needs \$3,500,000

**President McCarter Explains Company's Revenue Requirements at Rate Hearing in Trenton—Must Spend \$6,600,000 for Government Construction**

**A**SSERTING that national needs require the preservation of utility operation, Thomas N. McCarter, president Public Service Railway, Newark, N. J., told the Board of Public Utility Commissioners of New Jersey on March 27 how his company is confronted with an emergency demanding nearly \$3,500,000 of increased revenue. His statements were made at a hearing in Trenton on the company's application for a 7-cent fare, a 2-cent charge for transfers and a 1-cent charge for a transfer upon a transfer.

After explaining the utility situation as seen by Comptroller of the Currency Williams, Secretary of the Treasury McAdoo and President Wilson, Mr. McCarter said that his company's application is not based upon a valuation of the property but is for emergency relief. All the company desires is to be put back upon the 1916 basis. In January and February, 1918, the company ran \$82,500 behind last year in operating revenue, but \$50,000 of this was made up in March. Upon the basis of an estimated increase of about 2½ per cent in operating revenues for 1918, however; of estimated expenses based on present actualities; of 1916 depreciation expenses on a 1918 cost basis, and of an 8 per cent return on new capital since 1916, the company calculates a deficit of \$2,601,698 which must be overcome to reach the 1916 figure.

To the above-stated deficit Mr. McCarter added \$635,714 for additional wage increases which the company feels are necessary and which it will make if the desired fare relief is substantially granted. A further sum needed is \$257,061 for franchise and income taxes, making the total \$3,494,473.

## RAISING THE REQUIRED REVENUES

Mr. McCarter expressed the opinion that a 6-cent fare would produce a 10 per cent increase in revenue, or \$1,850,000, and a 7-cent fare a 15 per cent increase, or \$2,800,000. A 2-cent transfer charge was estimated to yield \$850,000, making a total of \$3,650,000. The revenue from the 1-cent extra transfer charge, included above, was put at only \$20,000 or \$30,000.

In the company's view, the only two fares capable of producing the desired revenue are the 7-cent fare with the stated transfer charges, or a 6-cent fare with a suspension of the transfer privilege. Either would be agreeable, but the company believes the first more equitable.

Mr. McCarter said that ultimately a passenger should pay for the distance traveled. With the enormous travel on American railways, however, with the difficulty of collecting the fares and with the interweaving of municipalities in New Jersey, the installation of a zone system would be a protracted job, impractical in the present emergency. An inquiry in regard to ultimate relief along this line, however, would be welcomed. Mr. McCarter added that after temporary relief is granted the company will have no objection to a

thorough investigation of its revenue needs on a regular rate-making basis.

Mr. McCarter then proceeded to tell how the urgent requests of the government for help will involve a total railway expenditure of \$6,643,043 for construction and equipment at present abnormal costs. Including twenty-five new cars just received, 300 new cars are desired for 1918, 125 of these being to meet the wishes of the government.

## CAPITAL EXPENDITURE FOR SAKE OF GOVERNMENT

The Shipping Board, Mr. McCarter stated, must have transportation to Port Newark Terminal. The government recently has entered into a contract with the company to advance more than \$800,000 to build a 2½-mile extension, on which an extra fare will be charged. The board has agreed to spread the peak so that the cars will carry 50 per cent of the traffic. On the money advanced the company is to pay 5 per cent during the war, and at the end of this the government will assume 50 per cent of the improvement cost as cost due to the war and the company will pay to the government the remaining 50 per cent, less depreciation, in five annual installments.

The Shipping Board also wants the company to operate additional cars to industries between the Hackensack and Passaic rivers, the companies or the board to build switch and loop tracks for easy entrance. More service is desired on the property of the New York Shipbuilding Company and to the shipyards of Gloucester in the Southern Division, and more power facilities in the Essex Division and the Southern Division.

Mr. McCarter said that for the government A. L. Drum had been making an examination of the railway needs and F. W. Darlington of the power needs. As to whether the government would contract for more than the first unit, as mentioned above, Mr. McCarter thought that the company would get further government aid only in case the government is satisfied that the railway is a solvent going concern. For the carrying out of government plans it is absolutely essential that the whole system be up-to-date and efficient.

## CITIES QUESTION JURISDICTION

Jerome T. Congleton, city counsel of Newark, questioned the power of the commission to pass upon the application, in view of local ordinances providing for a 5-cent fare and transfers. The chairman of the commission said that the question of law had just been passed upon by the Supreme Court, but Mr. Congleton replied that the issue might be carried to the Court of Errors and Appeals.

The case referred to above, which was decided by the New Jersey Supreme Court in February, was that of the Northampton, Easton & Washington Traction Company *vs.* the Board of Public Utility Commissioners.

The company had asked the consent of the board to increase its zone rate from 5 to 6 cents. According to the court's findings it was shown to the satisfaction of the board that the railway was being run at a loss each year even without making the necessary allowance for depreciation.

In such a situation the company could not perform its public duty to furnish safe, adequate and proper service and maintain its property in such condition as to enable it to do so. The commission thought that this duty was of inferior obligation to what it conceived was an irrevocable contract in favor of inferior branches of the State government—the municipalities through which the railway runs. The court, however, stated that it was unable to take this view, for reasons stated in an opinion filed the same day in the Collingswood case. The Northampton case, therefore, was remitted to the Board of Public Utility Commissioners for further proceedings, and it might be remarked that the desired fare increase has now been granted, as stated in the *ELECTRIC RAILWAY JOURNAL* of March 11.

#### FRANCHISE RATE MUST BOW TO STATE WILL

It appears that in the Collingswood case (*Collingswood Sewerage Company vs. Borough of Collingswood*), by a consent given by the municipality to the company under the act of 1898, maximum and minimum rates were fixed. Subsequently the sewerage company petitioned the New Jersey commission for increased rates, but the board refused permission on the ground of a lack of power.

The Supreme Court on review held that an ordinance granting consent and fixing maximum and minimum rates is a grant upon condition rather than a contract, and that the Legislature may clothe a commission with power to fix higher rates upon petition. The fixing of franchise limits between which the actual price of the service might be established by agreement or otherwise is rather in the nature of a legislative act to prevent extravagance than of a contract. The court considered the question of jurisdiction settled in favor of the board by at least three prior decisions: *Public Service Railway vs. Public Utility Board*, 85 N. J. Law 123; *North Wildwood vs. Public Utility Commissioners*, 88 N. J. Law 81; *Atlantic Coast Electric Railway vs. Public Utility Board*, 89 N. J. Law 407.

The court did not praise the Board of Public Utility Commissioners for turning over to the Borough of Collingswood a duty which the statute imposed on the board. According to the court's decision the board in effect and by inference found that the present service was not adequate, that extensions were reasonable and practicable, that the financial condition of the company could be made to justify the expenditures, and that new capital could be obtained for the purpose if the municipality would consent to a modification of rates. If this view was correct, the court said, the board should have ordered the necessary modification of rates and not shifted the responsibility to the municipality.

The Public Utilities Commission of Illinois has issued an order directing the Chicago, Ottawa & Peoria Railway to observe its agreement with LaSalle, Ill., relative to carrying county officers free of charge to and from county institutions until further notice.

## Fuel Administration Announces Zone System for Coal Distribution

New Method of Distribution Will Increase Rate of Flow Equivalent to 5 Per Cent Increase in Production

THE United States Fuel Administration in co-operation with the Director-General of Railroads has announced a zone system to govern the distribution of bituminous coal during the coal year beginning April 1, 1918. Heretofore coal has been distributed practically without regard to the distance between the mine and the consumer. Under the zone system it will be distributed to consuming territory under restrictions designed to avoid transportation waste, but with consistent maintenance of the greatest possible production and a proper supply to all coal users. Every effort will be made to preserve long-established trade relations.

In addition to the saving in transportation the system will provide for the possible retention of something like 5,000,000 tons of coal for Eastern states which heretofore has gone west by rail. As an indication of the saving to be effected by this system it will eliminate the moving of more than 2,000,000 tons of Pocahontas coal to Chicago and other Western points over a haul of about 660 miles. Chicago can obtain this tonnage of coal, and under this system must obtain it, from southern Illinois mines with an average haul of 312 miles. Allowing for the difference in quality in the two coals there will thus be saved 11,400,000 car-miles, estimated to be equivalent to 285,000 car-days. This will permit fourteen additional round trips of twenty days each from West Virginia mines to zone destinations, permitting an additional production of at least 700,000 tons of Pocahontas coal. Similar savings will occur in other sections of the country.

The production of bituminous coal, the movement of which only is regulated by the zone system, is about 300,000,000 tons or 60 per cent of the total production. Based on this production there will be saved on round trips from and to mines almost 160,000,000 car-miles. This will permit the same cars to make almost 300,000 additional trips from the mines, equivalent to an increase of 5 per cent in production. The increases in total production in 1917 over 1916 resulting from all efforts was about 8 per cent.

The zone system affects all bituminous coal except (1) That used for railroad fuel, (2) that moved on inland waterways which is in no way restricted by the system, and (3) that delivered to Canada, which is subject to regulation of the fuel administrator.

The early buying of next winter's supply of coal by consumers throughout the country is considered imperative by both the Fuel Administrator and the Director-General of Railroads. Ample production capacity has been assigned to each of the consuming zones, but these producing fields must be kept working as nearly as possible at the maximum capacity.

The method of enforcement of the zone system is that the Fuel Administration prohibits distribution beyond the limits of the zone and the railroad administration supplements these prohibitions by railroad embargoes. The Fuel Administration will issue permits for the shipment of coal for special purposes to points



outside the zone in which the particular coal desired originates. Applications for permits are to be addressed to the United States Fuel Administration, Coal Zone License Bureau, New Interior Building, Washington, D. C.

## Rates the Feature of Meeting

**Large Part of First Session of Wisconsin Meeting Given Up to This Topic—Fuel and Taxes Also Discussed**

ADDRESSES dealing with problems affecting public utility rates were the feature of the tenth annual convention of the Wisconsin Electrical Association at Milwaukee, March 27-28. Other topics including fuel and technical problems were discussed, but the sessions at which three able speakers presented different angles of the present rate situation were easily the banner sessions. President B. F. Lyons of Beloit sounded the keynote of the meeting in his address pointing out the needs of the utilities of Wisconsin for increased rates and commenting briefly on the national measures of conservation including the shutting down of isolated plants, the interconnection of generating stations and the passage of the daylight savings bill.

The first of the addresses was one by Edwin S. Mack of Miller, Mack & Fairchild, Milwaukee. He dealt with two important phases of public utility depreciation. The first of these was the method treating depreciation reserve in Wisconsin. He contended that while the Wisconsin commission has included depreciation reserve in value, it has not followed out to the logical result that where the depreciated value basis is used, the return on the fund should go to the investor and not to the fund. He expressed the hope that the commission would come to the value-new theory as the one logical and continuous base. So long, however, as the present basis is adhered to it should be kept in mind that depreciation must be on the straight line basis. The other phase of depreciation discussed dealt with the elements of depreciation reserve. The speaker urged that in all valuation cases in determining the rate for setting aside depreciation reserve the commission should grant the allowances not only for the factors indicated in the life tables, which include only age and wear, but also for such other important unforeseeable and dangerous factors as obsolescence, inadequacy and public requirement.

William J. Hagenah, basing his address on curves showing the range of commodity prices over a period dating back to 1817, predicted that few if any public utility managers in the room would live to see prices return to their pre-war level. For this reason he urged the closest co-operation between the utilities and the commissions so that the utilities may be adjusted to the changed conditions under which they are operating and will be obliged to operate for many years.

The third speaker on rates was Harold L. Geisse, secretary of the Railroad Commission of Wisconsin. His paper was devoted to showing public utility men how to prepare and to present rate cases to expedite their passage through the hands of the commission. He made two pertinent suggestions. The first was that the company seeking increased rates advise the

local city attorney or other authority likely to contest the plea of its plans in advance so that this individual could not claim surprise and ask for a delay to prepare for the case. The other suggestion was that at times the use of logarithmic charts for presenting comparative data be adopted for the sake of clarity.

Speaking on the fuel situation W. N. Fitzgerald, Wisconsin State Fuel Administrator, declared that the coming winter would bring a national demand for increased production amounting to 100,000,000 tons. It will be possible to increase production only 50,000,000 tons. The rest will have to be saved by conservation measures. He urged public utilities to help in this work. The committee on taxation, C. S. SeCheverell, Superior, chairman, repeated its assertions of former years that public utilities are discriminated against in the matter of taxes.

Other papers which were to be delivered at the second session were "The Utilities and the War," by M. C. Ewing, Wausau; "Metal Electrode Welding," by Dean Treat, La Crosse; "Increasing the Efficiency of Hydro-electric Plants," by Daniel W. Mead, Madison, and "Three-Phase Four-Wire Distribution," by George E. Wagner, Madison.

## AMERICAN ASSOCIATION NEWS

### War Board Issues Bulletin on Government Control

AS NO. 13 in its series of bulletins the Electric Railway War Board has sent out a reminder of the duty of the electric railway companies to return to the Commissioner of Internal Revenue a statement of employees' incomes where such exceed \$800 per annum. Some extracts are also given from the federal control bill S3752, which was signed by the President on March 21, indicating certain phrases which refer to electric railways.

### Rousing Public Service Meeting at Jersey City

THE meeting of the Public Service section held in the Montgomery Street carhouse, Jersey City, on March 21 was one of the most enthusiastic ever held by the section, 400 employees being in attendance. The meeting was a smoker with quite an elaborate luncheon and a general "get together." Informal addresses were delivered by N. W. Bolen, general superintendent; R. E. Danforth, general manager, and R. E. Perrin, claim agent.

Mr. Bolen summarized the growth of the electric railway business from the early days, and then took up the question of how best to handle the greatly increased business which the war has brought to the State of New Jersey. He analyzed this growth by referring to the increase in a number of industries stretching all the way from Camden to Edgewater. Mr. Danforth told of the greatly increased cost in operation, due to labor and materials price advances, and strongly emphasized the need for additional revenue. He urged the men to do their bit by conserving power and thus saving fuel. Mr. Perrin directed the thought of the



meeting along the lines of safe and efficient operation, in order that the expenditures for claims settlements may be minimized.

As would be expected at a smoker entertainment features of the meeting were prominent. There was music from the Hudson division band and from the West Hoboken carhouse quartet. Two Greenville conductors gave an exhibition four-round boxing bout and the whole company sang patriotic and other songs.

### "Electropneumatic Interlocking" Has the Floor at Chicago

A MEETING of the Chicago Elevated Railroads company section was held on March 19, the principal speaker being J. W. Stephenson, signal engineer of the company. He presented a paper on "Electropneumatic Interlocking," with the aid of lantern slides, the idea being to show the members the relation of this feature of operation to their several departments.

M. J. Feron spoke briefly of the gratifying results which had been obtained through the installation of coasting clocks, and took the occasion to express his appreciation of the spirit of co-operation which exists between the men of the transportation and traffic departments, without which this excellent showing could not have been made. H. A. Johnson followed with remarks along the same line, and answered questions which had been asked by a motorman with regard to coasting.

Interspersed with the technical discussion were songs, recitations and ukulele solos. Following a custom which seems to be general among the sections the program opened and closed with patriotic songs. Vice-President R. N. Griffin presided at the meeting, which was attended by seventy-five members and guests.

### Rhode Island Company Employees Appoint Section Organization Committee

AS ANNOUNCED in the issue of the ELECTRIC RAILWAY JOURNAL for March 23, employees of the Rhode Island Company, Providence, R. I., plan to form a company section of the American Association on April 9. In response to an inquiry as to the steps which led to the present plan, A. E. Potter, president Rhode Island Company, stated substantially as follows:

"In order to explain the difficulties confronting the company and the efforts which were being made to secure relief through an increase in fares, etc., the management arranged a meeting on Nov. 30, 1917, to which the heads of departments, foremen and clerical forces were invited. This meeting proved so popular that other meetings were held on Jan. 29 and March 5. At the last meeting the suggestion was made that a company section be formed, and this met with immediate approval. It was unanimously voted to appoint a committee to arrange for the organization of a section.

"The committee appointed consisted of R. R. Anderson, superintendent of transportation; E. J. Cooney, executive assistant; A. B. Gardiner, superintendent of frack; A. E. Paddock, general freight agent; C. E. Redfern, claim agent; H. W. Sanborn, chief engineer; H. B. Shaftoe, assistant to the comptroller; B. T. Whitcomb, chief electrician of power distribution, and

## The Use of Slack Adjusters as a War-Time Economy

Philadelphia Rapid Transit Company Is Installing More than 4000 Adjusters After Investigation Covering Several Years

MORE than five years ago, in February, 1913, the Philadelphia Rapid Transit Company installed on a car equipped with Brill 39-E trucks its first equipment of Anderson slack adjusters. This equipment was put on for the purpose of giving the device a thorough test, and its operation has since been under the surveillance of the head of the bureau of tests, which is a part of the rolling stock department of the railway com-



SLACK ADJUSTER IN POSITION ON TRUCK

Picture selected to show general principle of P. R. T. adjuster but not detail of brake-beam clamp, for which see drawing.

pany. Whenever there was any adjustment needed and at stated times the engineer of tests examined the adjusters. They have operated so satisfactorily, however, that practically no attention from him was required. About a year ago an outfit was placed on a car equipped with Brill 27-G trucks, also with satisfactory results.

As a result of the tests the company, some months ago, decided to install the adjusters on 2149 cars, and they are being put on now as fast as received.

In deciding to install slack adjusters on such a large scale the officials of the company were convinced that their use would very greatly cut down the labor of inspection and adjustment of brake rigging. Experience had shown that with them no adjustment is necessary during the entire lifetime of a brakeshoe, six weeks or more on the P. R. T. system, on the average. Without them the "brakemen" must go over the brake rigging

W. D. Wright, supervisor of equipment. This committee met with E. B. Burritt, Martin Schreiber and H. C. Clark, representing the American Association on March 19. At this time it was decided to hold a meeting for the purpose of organization on April 9. The general committee has selected two sub-committees, one to submit by-laws and the other to submit nominations for officers at the April 9 meeting."

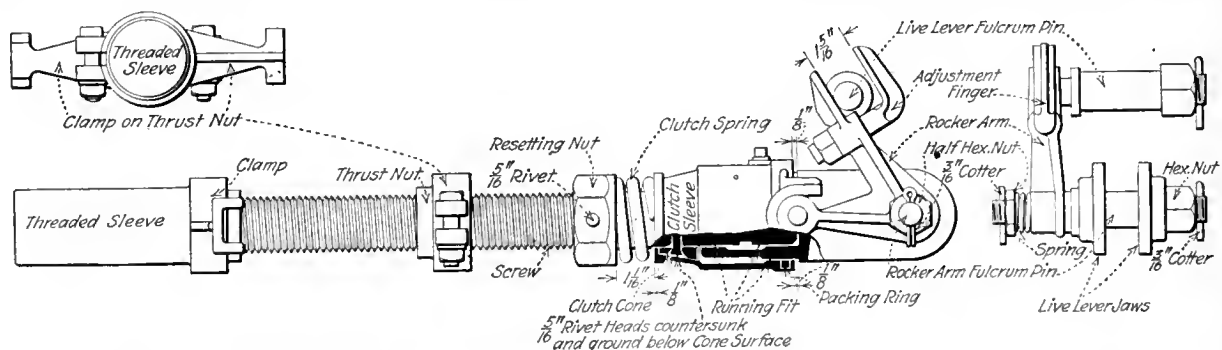
every day or every two days taking up slack. With slack adjusters, when the proper brake setting is once made, the inspector has ample time to attend to other elements of the equipment and the inspection as a whole is much more thoroughly done than would otherwise be the case.

The adjustment of the brake rigging is not only a tedious and time-consuming process, but even a careful pitman is apt to overdo it in the matter of taking up slack and to leave the rigging too tight. The result is that a car leaves the carhouse with brakes in contact with the wheels. That cars do leave the carhouse with brakes set too tight is indicated by the sluggishness with which some of them operate for a time after inspection. They slow down far too rapidly when

The adjuster connects the lower end of the live lever with the brake beam by means of a screw, the rotation of which increases the distance between the brake beam and the end of the live lever and thus makes up for brake wear.

The screw is rotated by means of a clutch at one end, operated through a bell-crank by the upper live-lever fulcrum pin. At the right in the drawing are shown the special live lever fulcrum pins which are necessary to support and operate the bell crank and also to support the clutch end of the screw. The upper fulcrum pin plays between two jaws, one of which is adjustable, the clearance being just sufficient to permit normal operation of the brake rigging when properly adjusted.

If when the brakes are applied there is too much



GENERAL ASSEMBLY DRAWING OF AUTOMATIC SLACK ADJUSTER FOR USE ON DOUBLE-TRUCK CAR

power is shut off. The result of tight setting is to cause an excessive rate of consumption of brakeshoe metal and of electrical energy, besides producing a tendency to decreased schedule speed.

Obviously the slack adjusters will cause a reduction in brakeshoe wear, accompanied by less wheel wear and less armature maintenance cost. The last-named item is one considered as very important by the P. R. T. engineers.

Aside from the direct savings mentioned above as due to the use of slack adjusters, a great operating advantage is secured in the smaller number of car "pull-ins," particularly those due to failure of the brakes to hold. A common complaint from motormen has been: "The brakes on this car are not holding well." They turn the cars in for brake adjustment, and thus car-hours are lost while the cars are awaiting their turn for inspection, and man-hours (or man-minutes) are lost while the adjustments are being made. There is also a psychological operating advantage in always having the brakes in "A-1" condition, in that the motormen will operate their cars with greater confidence and will thus have an easier time in keeping up the schedule speed.

From the standpoint of the brake rigging itself there is a great advantage in having a uniform piston travel, and the tests have shown that with the adjuster the variation is very small. On the P. R. T. property it varies between  $5\frac{1}{4}$  and  $5\frac{1}{2}$  in.

A description of the Anderson slack adjuster as applied to single-truck cars (Brill 21-E, Taylor and St. Louis trucks) appeared in the issue of the *ELECTRIC RAILWAY JOURNAL* for Sept. 30, 1916, page 690. The accompanying line drawing shows the device as adapted to the Brill 39-E truck, the construction shown being that used on the P. R. T. system for trucks of this type.

slack the clutch is rotated by the bell-crank in a clockwise direction, the outer shell slipping upon the cone. The clutch slips because the main screw, being under compression, is practically locked against rotation. When the brakes are released the bell crank rotates the clutch in a counter-clockwise direction, taking the screw along with it and compensating for wear.

The illustration shows all of the parts mentioned and in addition the clutch spring for maintaining the proper pressure between the cone and shell of the clutch, with the nut for adjusting it; the thrust nut and clamp for connecting the screw to the brake beam, etc.

### Graphical Presentation of Accident Data

IN ORDER forcibly to present data on accidents occurring in its plants the United States Steel Corporation has classified more than 150,000 of these and presented the results in graphical form for consideration by its employees. While the particular classification would not be applicable to electric railways, the method of presentation would be effective in this field. First, all accidents are segregated in groups and the numbers reduced to percentages. The entire list is represented by a large circle divided into sectors, in the familiar fashion, the whole representing 100 per cent. The groups in this case are hand labor, machinery, mines, railroads, burns, eyes, falls and all other causes. Surrounding the large circle are seven smaller ones each representing one of these groups and each appropriately subdivided.

A boiler-inspection bureau for the State of New Jersey was provided by the legislature at its recent session by passage of Senate Bill No. 209. The act goes into effect immediately.

# News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

## Vote to Develop Water Power

Nation's Business Men Call on Congress to Provide for Utilizing the Country's Water Power

By sweeping majorities of 500,000 business executives who comprise the membership of the United States Chamber of Commerce adopted resolutions on March 27 calling on Congress to make provision for harnessing the millions in water horsepower that now are idle. The vote was taken through the more than 1000 commercial organizations throughout the country which compose the National Chamber.

The balloting was based on a series of recommendations contained in the report of the committee on water power development of the United States Chamber of Commerce. These recommendations were presented in the following order:

1. That federal legislation encouraging the development of water powers should at once be enacted; adopted by the almost unanimous vote of 1324 to 6.
2. That authority to grant permits should be vested in an administrative department; carried by a vote of 1253 to 17.
3. That the permit period should be at least fifty years, any shorter period being at the applicant's option; in favor 1216, opposed 42.
4. That tolls should attach only to use of public lands or benefits derived from head-water improvements; adopted by a vote of 1191½ to 40½.
5. That permittees should be entitled to acquire the right to use public lands forming only a small and incidental part of the development; carried by a vote of 1210 to 25.
6. That recapture should be exercised only upon payment of fair and just compensation; in favor 1234, opposed 25.
7. That if recapture is not exercised, the investment of the permittee should be adequately protected; adopted by a vote of 1226 to 26.
8. That rates and service should be regulated by state commissions where the service is intrastate, with federal regulation only where several states are directly concerned and do not agree, or there is no state commission; carried by a vote of 1177 to 57.
9. That if any jurisdiction to regulate the issuance of securities is exercised it should be solely by the state; in favor 1114, opposed 117.
10. That no preference should be granted as between applicants amounting to a subsidy from the government creating unequal competition; adopted by a vote of 1191 to 38.

The committee which drew up the re-

port and presented the resolutions was composed as follows:

L. S. Gillette, chairman, Minneapolis; Harry A. Black, Galveston; Rome G. Brown, Minneapolis; Henry S. Drinker, Bethlehem, Pa.; Frank P. Glass, Birmingham; E. K. Hall, New York; Horace C. Henry, Seattle; Henry L. McCune, Kansas City; Samuel V. Stewart, Virginia City, Mont.; George F. Swain, Boston, and C. F. Weed, Boston.

While the committee's report is in itself favorable to positive legislation to enlarge water-power development, every ballot sent out was accompanied by an argument in the negative which clearly and positively set forth objections to the recommendations so that those voting had at hand data on which to base their judgment for or against.

## Peter Witt on Co-operation

Former Commissioner of Cleveland Tells How City and Company Benefited Under Tayler Grant

Peter Witt, former street railway commissioner of Cleveland, Ohio, was a witness recently before the Massachusetts legislative committee on street railways. He urged the service-at-cost plan of operation for the roads there. During the hearing he reviewed the railway situation in Cleveland. Mr. Witt is reported to have said:

"Neither Tom Johnson and his followers nor the officials of the railway in Cleveland thought very much of the plan at the time it was adopted, but at the end of eight years it has proved a success from every viewpoint and nobody in Cleveland would think of going back to the old order of things.

"Let me tell you how the plan was started. Mr. Johnson and his followers wanted public ownership. This the laws of the State denied. The railway wanted private ownership. The voters were opposed to this. The service-at-cost plan was then devised, after prolonged negotiation. Its purpose was, and is, not only to give the people the sort of service that they want and need, but also to protect the investors and assure them a reasonable return on their money.

"In Cleveland, experiences show that one of the first benefits to be gained through the co-operative plan is in getting the confidence of the riding public, and to change people who have been continual 'knockers' into sincere 'boosters.' Again, the plan makes it easy to finance the properties. This, in turn, enables the companies to make improvements when and where they are needed."

## Construction Disapproved

California Commission Carries Into Effect Its Recently Announced General War Policy

The Pacific Electric Railway, Los Angeles, Cal., has been denied authority by the California Railroad Commission to build a line from Anaheim through Tustin to the town of Irvine, a distance of about 11 miles, and also a line from Glendora to Lone Hill, about 4 miles. Witnesses for the company testified that arrangements had practically been completed for laying the tracks. The estimated total cost of both lines is more than \$440,000, of which more than \$127,000 has been spent for right-of-way, engineering work and materials.

In its decision refusing the application the commission stated, in part:

"There is nothing to indicate that either of these lines is more needed now than before the war. The company states that these new lines are planned primarily to increase net revenue. The fact that the country is at war, and is husbanding for war purposes its resources in men, money and materials is a factor too powerful to be ignored. True, the Pacific Electric Railway was not included among the railroads taken by the government, but the Southern Pacific, which controls the Pacific Railway, was included and so was the Santa Fe."

Commissioner Alex Gordon, who wrote the decision, did not agree with President Paul Shoup of the Pacific Electric Railway that it is the policy of the government to turn business from the steam to the electric lines if the electric lines are first to be constructed. Commissioner Gordon said:

"There is another phase of the situation which should be mentioned. The Southern Pacific and the Santa Fe are competing with each other for business over the entire southern part of the State. Neither could make extensions without the consent of the Director-General of Railroads. However, the Pacific Electric Railway, a subsidiary company of the Southern Pacific, which was not included in the government's orders, can make such extensions as it desires, as far as the federal government is concerned. As the new lines are so close to existing lines of the Santa Fe, the bulk of the earnings of both lines will come from freight diverted from the Santa Fe. If the railroads are eventually turned back to their private owners the present situation seems to be unfair, although this aspect of the matter is possibly one for the federal government rather than for this commission to consider."

## Letters and Opinions Fly in New York

### Lively Discussion by Mayor, Railroad Executive and Commissioners Follows Fare Appeal

A four-cornered exchange of letters and expressions of opinion in New York City has resulted from the appeal of the electric railways to the Legislature for a 6-cent fare. The participants have been Theodore P. Shonts, president of the Interborough Rapid Transit Company; Mayor John F. Hylan and Public Service Commissioners Hervey and Whitney. The exchange of amenities was started by Mr. Shonts, who in a letter to the Mayor, pointed out that the purpose of the increase was to insure the payment of the Interborough's preferential under the dual system contracts and to insure sufficient earnings to keep the New York Railways out of bankruptcy. In part, Mr. Shonts wrote as follows:

"Using this increased rate as applicable to the Interborough's earnings of last year—which aggregated about \$40,000,000 on a 5-cent basis—and on the theory that all persons who rode on a 5-cent basis would ride on a 6-cent basis, the Interborough earnings would be \$8,000,000 greater, and, of course, this would have been all net.

"Therefore, assuming that the average preferential which the Interborough would receive out of this \$8,000,000 was \$2,000,000 a year, it would leave \$6,000,000 for other purposes. On the theory that the city will have, when the work is completed, \$100,000,000 invested at 4½ per cent in the Interborough's system, the next deduction from the \$8,000,000 increase above mentioned would be \$4,500,000 to pay the return on the city's investment. This on top of the \$2,000,000 to pay the Interborough's preferential in full would absorb \$6,500,000 of the \$8,000,000, leaving \$1,500,000 out of which to meet the increased labor demands which, in the nature of things, will be presented at the expiration of the present contracts with the Interborough employees—about Sept. 1 of this year.

"I further pointed out to you that this \$4,500,000 chargeable to the city could only be provided for in one of two ways; either by putting the burden on the taxpayer in the one case, or on the farepayer in the other."

Mayor Hylan in his letter to Mr. Shonts indicated that he would not aid any attempt to increase fares on New York transportation lines, but would do all he could to have the lines taken over and operated by the city. The Mayor also made it plain that he heartily disapproved of the dual system contracts.

In a later letter to Mr. Shonts the Mayor stated that it was his belief that even though the 6-cent fare was not put into operation the Interborough will be forced under the rapid transit contract to put the dual system into operation. In the letter the Mayor flayed the Public Service Commission

for its delays in putting the Lexington Avenue and Seventh Avenue subways into operation, and intimated that its reluctance might be due to the hope that the delay might help in securing the 6-cent fare.

Public Service Commissioner Charles S. Hervey next issued a statement in which he opposed legislation at Albany for a 6-cent fare on the surface and rapid transit lines of the city. Mr. Hervey's objections are based on his belief that, so far as the surface lines are concerned, the present public service law is adequate to give promptly any relief to the companies which is justified by present conditions. With respect to the subway and elevated lines of the city, he pointed out that there was no need for legislation because the Board of Estimate & Apportionment, the Public Service Commission and the railroads acting jointly could fix any rate of fare that was adequate and proper, by a modification of the existing dual contracts. Such a modification did not require action by the Legislature.

#### COSTS BROOKLYN COMPANY 6½ CENTS FOR EACH PASSENGER

Travis H. Whitney, of the commission, indicated in a statement issued on March 25, that despite the Mayor's opposition to 6-cent fares the commission was sympathetically inclined toward the plaint of the Brooklyn Rapid Transit Company. Mr. Whitney said that every 5-cent passenger on the new subway lines costs that company about 6½ cents. His statement dealt with No. 4 of the dual subway contracts between the city and the company. Mr. Whitney said that from August, 1913, to January, 1918, the city's deficit had been \$4,947,244 and that of the Brooklyn Rapid Transit Company \$1,148,221. He explained that the company was permitted under the contract to dip into the pooled earnings to pay its interest and sinking fund. War conditions were responsible for the deficits. He compared the situation to that in which the railroads found themselves when the government took over their operation. He said:

"The principle that when the public requires large extensions of service, or control of operation, the company is entitled to a certain preferential and that the public will pay the remaining expenses out of taxes has been followed in the case of trunk line railroads of the United States. The President has taken the railroads because of war conditions and the companies are being guaranteed a certain return. If the revenues are insufficient the deficit is to be cared for out of appropriations by Congress of moneys arising out of some form of taxation.

"In order to keep such deficit, payable by Congress, to a minimum, Director General of Railroads McAdoo has indicated his intention to increase rates, eliminate duplicate service, reduce passenger service and effect other economies. The principles which the commission and the city placed in the dual contracts in 1913 are the principles now being followed in respect to the national control of the railroads of the country."

Mayor Hylan sent another letter to Mr. Shonts on March 26 in reply to the letter, in which Mr. Shonts asked the Mayor to define his position in regard to the Interborough's request to be allowed to charge a 6-cent fare on its lines. In his letter of March 26 the Mayor called upon Mr. Shonts to furnish him with data showing in detail the expenses of his various companies as well as the number of passengers carried on all the lines during the last five years. In regard to fares the Mayor said:

"No further proposition need be made to me. I will not become involved in any plan that connected me in any way with those who have been in sympathy with this method of plundering the city. I shall direct the commissioner of accounts, the corporation counsel, and every other public official that I can command, to look into these transactions and see if something cannot be done to protect the city."

Mr. Shonts has promised to have the data prepared at the earliest possible moment.

## Exciting Times

### Session of New York Senate Enlivened by Passage at Arms Over Municipal Ownership

The Senate of New York on March 26 passed by a vote of twenty-eight to twenty the resolution of Senator Elon R. Brown creating a committee of seven Senators to investigate the question of municipal ownership. Senator Brown asserted that municipal ownership was a step toward socialism, and that now that the war is on the people should devote their energies to supporting the battle line of the allies in France and not to upset established institutions, as the bolsheviks in Russia are doing. On the other hand, Senator Wagner, the Democratic leader who introduced the bill, fostered by Mayor Hylan of New York, charged that the resolution was a parliamentary trick and an effort to sandbag the whole proposition.

Senator Slater charged that the municipal ownership bill was nothing but a political boom for William Randolph Hearst. He is reported to have said:

"It is the jellyfish and toad bill, and it was born in Palm Beach after a conference attended by Hearst, Hylan and Fingy Connors."

After Senator Ottinger had also criticised Mayor Hylan, Senator Foley, a



Tammany member, objected to his language on a question of personal privilege.

A second resolution by Senator Brown, appropriating \$5,000 so that the municipal ownership committee could continue its investigations through the summer and fall and report to the next Legislature was defeated, getting only twenty-five votes. The result is that the committee will have to consider all municipal ownership measures at this session unless the Senate reverses its position later.

## Sympathetic Strike in Kansas

**Railway Company Not Affected, but Some Light and Power Company Men Go Out**

Business agents of labor in Kansas City, Mo., on March 15, following suggestions from several of their unions, announced that a general strike would take place on March 23 unless the laundry owners had effected a settlement with the drivers who quit on Feb. 18. Since the strike of the laundry drivers, the laundry owners, who had resumed operations with other workers than the strikers, have consistently responded to all suggestions of arbitration that they were operating their plants and had nothing to say to the unions.

The situation is far different in regard to this strike of laundry drivers, and the general threatened strike, than was the case last summer and fall. At that time, for various reasons, a considerable public sentiment was on the side of the striking electric railway employees, and workers in other industries that were suspended. Eventually sympathy turned the other way; and it has been getting stronger the other way ever since. At the present time, there is very little public sympathy on the side of the union men who are fomenting the general strike. The public seems to believe that a general strike would be merely a useless union expedient to compel unionization of plants which are now giving almost normal service with non-union labor.

The negotiations looking toward a settlement failed, and the sympathetic strike began on the morning of March 27. The employees of the Kansas City Railways voted not to join in the strike and apparently cars will not stop. Four employees at the power plant of the company belonging to other unions struck, but this has not hampered operation. The railway power load, however, increased by reason of the strike of union men employed by the Kansas City Light & Power Company at its two power plants. The brewery workers, bartenders and building trades were the only unions that quit in a body, but many individual engineers and firemen in downtown buildings also quit. In addition a few other minor industries were effected.

A press dispatch dated March 28 indicated that the railway men had gone out under threats of intimidation.

## Chicago Program Moving

**Rapid Transit Plans Started on Their Way with Possibility of Vote In November**

Rapid transit prospects for Chicago through the building of subways and the extension of elevated lines were advanced a step by the action of the local transportation committee of the City Council, which on March 20 concurred in the recommendations of the Traction & Subway Commission and the modifications proposed by the companies.

### COMMITTEE WILL DRAFT COMPLETE ORDINANCE

The physical side of the commission's report was abstracted in the *ELECTRIC RAILWAY JOURNAL* for Dec. 9, 1916. The companies agreed to this plan, with a few changes in the location of new elevated lines and the advancement of certain work into an earlier period. Now that the committee has gone on record as favoring the modified plan, a sub-committee of seven Aldermen will proceed with the work of drafting a complete ordinance. If the final report is approved by the City Council, the people of Chicago will have an opportunity to vote upon it, probably next November. If any enabling legislation is necessary, this will be taken up with the next session of the State Legislature in January, 1919.

The transportation improvements so far agreed to call for an expenditure of about \$104,000,000 within a six-year period. Of this amount between \$20,000,000 and \$25,000,000 is already available in city's traction fund derived from a portion of the net proceeds paid to the city during the last ten years by the surface railway companies.

### THREE SUBWAY AND FOUR ELEVATED LINES

In brief, the plan calls for the construction of three subways and four elevated railway extensions. One of these subways is intended for use by surface lines, to avoid congestion in the downtown district. Another one will be used to provide additional capacity for rapid transit lines running north and south through the same district. Some of the Aldermen wanted extensions of elevated lines beyond the limits agreed to by the companies, but they were told that to do this would mean that the system would not be on a self-supporting basis.

H. M. Brinckerhoff, who was chief engineer for the commission which made the report, was present at the final session and enlightened the members on several matters about which there was some doubt.

The Traction & Subway Commission is composed of William B. Parsons, Robert Ridgeway and Bion J. Arnold. The expenditure of \$100,000,000 recommended by them in 1916 was called for in the course of nine years. The

ultimate investment to carry out the plans of the commission through the year 1950 is placed at a minimum of \$260,000,000.

## Status of Franchises

**Action Begun in Tacoma To Determine Whether Commission Can Set Aside Franchise Provisions**

The Tacoma Railway & Power Company, Tacoma, Wash., has taken mandatory action to the Supreme Court, to determine finally whether city franchise provisions can be set aside and the statutory limitation of electric railway fare to 5 cents disregarded by the Public Service Commission.

### COMPANY DENIED RELIEF.

On petition of Louis H. Bean, manager of the company, Chief Justice Ellis of the Supreme Court has issued an alternative writ of mandate commanding the commission to authorize cessation from franchise obligations and increase of fare, or show cause in the Supreme Court why this should not be done.

In its application for mandatory action, the company declares that the commission has denied it relief from the 5-cent fare limitation and from franchise obligations which require it to pay a gross earning tax, contribute to cost of paving and bridge building and carry employees free, while at the same time the commission holds in the Tacoma Avenue case that unless the company is allowed to charge rates in excess of 5 cents and is relieved of its franchise obligations, it cannot furnish the safe, adequate and sufficient service which the public demands.

In this case, the Supreme Court will have to pass directly upon the disputed law points of whether the commission is empowered by the law creating it to disregard franchise provisions, and to increase fares.

### SERVICE HEARINGS AWAIT COURT DECISION

The hearing before the commission on the Tacoma Commercial Club's complaint, charging inadequate railway service in Tacoma, has been postponed until after April 1. Similar action has been taken with respect to the hearing on Seattle complaints.

If the Supreme Court holds in favor of the company's contention that the commission has the power to increase fares and set aside franchise provisions, the commission will then proceed with hearings for the purpose of determining to what extent such action shall be taken. Application made by the company for a writ of mandate provides for this later exercise of jurisdiction by the commission.



## Electrics Exempted

### President Signs Measure Providing for Government Control of Railroads Until After War

President Wilson signed the railroad control bill on the afternoon of March 21. So far as the electric railways are concerned the measure follows the proclamation of the President on Dec. 26 putting the railroads under government control, but exempting the street and interurban railroads, only those electric railways whose freight receipts exceed their passenger receipts being taken over. That part of the measure dealing with the electric roads is as follows:

"That every railroad not owned, controlled or operated by another carrier company, and which has heretofore competed for traffic with a railroad or railroads of which the President has taken the possession, use and control, or which connects with such railroads and is engaged as a common carrier in general transportation, shall be held and considered as within 'Federal control,' as herein defined, and necessary for the prosecution of the war, and shall be entitled to the benefit of all the provisions of this act: Provided, however, that nothing in this paragraph shall be construed as including any street or interurban electric railway which has as its principal source of operating revenue urban, suburban or local interurban passenger traffic, or sale of power, heat and light or both."

Federal control of the railroads is to continue for and during the period of the war and for a reasonable time thereafter, not to exceed one year and nine months following the date of the proclamation by the President of the exchange of ratifications of the treaty of peace.

## Signal Corps Openings

### Many Electrical Men Required for Various Branches of Radio Communication Work

The Signal Corps, United States Army, has announced that it can use the services of a large number of wiremen, expert electricians, storage battery men, telegraph and wireless operators, and men with electrical engineering training and experience. They are needed especially in connection with the radio communication systems for use in the military service. This branch of the service has been most aptly characterized as the nerve system of the army. The scope of the work requires men who will fall in general into three classes, namely, radio operators, radio mechanics and field radio experts.

Application blanks for this service may be secured by addressing the office of the Chief Signal Officer, Land Division, Training Section, Washington, D. C. Men of draft age may make application and if qualified will be inducted into the army, at their request, for service in this branch of the Signal Corps. After enlistment or induction,

all personnel will be sent to one of several radio schools for six weeks to three months of intensive training in one of the three general branches of the radio work for which their previous experience qualifies them. Some of the personnel completing these courses will be commissioned, and the opportunity for advancement for all graduates will be dependent on the individual ability.

## News Notes

**Increase in Wages at Huntington.**—A voluntary increase of 2 cents an hour for motormen and conductors has been announced by the Ohio Valley Electric Railway, Huntington, W. Va.

**Wage Award Accepted.**—Arthur E. Stone, treasurer of the Boston & Worcester Street Railway, Boston, Mass., has reported to the State Board of Conciliation & Arbitration that the company had accepted the wage award of Feb. 14. Under the award the men in the employ of the corporation will receive back pay for a period of eighteen months in some cases.

**Advance in Wages in Fort Wayne.**—A notice has been posted announcing a wage increase of 2 cents an hour to employees of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., with an additional 3 cents an hour when one-man cars are placed in service. Under the new wage schedule men in the service less than a year receive 24 cents an hour. The maximum rate is 28 cents an hour. This applies to men in the service five years or more.

**Electrical Workers Strike.**—Fifty union electrical workers in the employ of the Des Moines (Ia.) City Railway and the Inter Urban Railway are on strike. The men are asking for an increase of 5 7/9 cents an hour. The company has offered an increase of 2 cents. James J. Barrett, representing the Federal Department of Labor, is at Des Moines, attempting a settlement. The strike affects the armature men, linemen and power-house and sub-station men.

**Would Change Commission Law.**—Wilson T. Hume, one of the attorneys who represented the city of Portland, Ore., in the case before the court involving the Public Service Commission and the Portland Railway, Light & Power Company over 6-cent fares is drafting a measure that will provide for the enactment of an initiative law vesting municipalities with power to regulate utilities in incorporated cities. He is said to have expressed the opinion that the abolition of the Public Service Commission would not remedy the 6-cent fare situation. Under the

measure proposed by Mr. Hume the commission would still have jurisdiction over the grain department, logging franchises, and utilities outside incorporated cities.

**Municipal Railway Fund Provided.**—At the city election in Seattle on March 5 the voters authorized the transfer of bonds in the sum of \$350,000 from an original bond issue of \$800,000, for the construction of a double-track municipally owned and operated elevated railway over Washington Street, Railroad Avenue, Whatcom Avenue and Spokane Street, extending from the west margin of First Avenue South to the West Waterway. The line will provide at least a partial solution of the congestion problem in the industrial district and give increased transportation for shipyard workers. Work will progress immediately, and it is expected that the line will be completed within less than six months. Of the \$800,000 bond issue authorized for the construction of the Seattle municipal street railways, \$425,000 has been used to date.

**M. O. Negotiation Progress.**—The report of M. M. O'Shaughnessy, city engineer of San Francisco, Cal., on the general negotiations for the purchase of the entire United Railroads' properties by the city has been favorably received by the special committee working with the Mayor and the public utility committee of the supervisors. This committee has indorsed that part of the report which arrived at the basis of valuation of the physical properties and the city engineer was authorized to proceed with William von Phul, vice-president and general manager of the United Railroads, to see if an agreement can be reached as to what the net earnings of the company might be for the remaining term of its franchises. Points of agreement previously established in the negotiations were referred to in the ELECTRIC RAILWAY JOURNAL for March 16, page 536.

**Suit for \$450,000 Dismissed.**—When the United States Supreme Court recently dismissed the suit of the Puget Sound Traction, Light & Power Company against the Duwamish Waterway for \$450,000, the last of the suits was disposed of that were filed against the Waterway district growing out of the several hundred condemnations made by the district several years ago. The company alleged that through the straightening of the river to make the improvements authorized by the district, its power plant had its fresh water supply cut off. Superior Court Judge Kenneth Mackintosh upheld the right of the district to make the improvement. An appeal to the State Supreme Court followed. In affirming Judge Mackintosh's decision, the State Supreme Court held that the plaintiff company had no property right in fresh water in a navigable stream, nor in the bed of the river, as had been held by Judge Mackintosh. The appeal to the United States Supreme Court followed.

# Financial and Corporate

## Denial Entered

**Pittsburgh Companies Ask Dismissal of Action in Which Application Was Made For a Receiver**

Reply has been made by the companies to the bill in equity, on behalf of Benjamin C. Allen, acting for himself and other holders of the first mortgage bonds of the Union Traction Company, Pittsburgh, Pa., filed on Feb. 15 against the Philadelphia Company, the Pittsburgh Railways and the United Traction Company, Pittsburgh, in the District Court of the United States in the Western District of Pennsylvania. In the bill of complaint it was charged among other things that the responsibility for the principal and interest on underlying bonds of the companies which go to make up the Pittsburgh Railways system was with the Philadelphia Company, and the court was asked to "recognize and enforce the liability which the Philadelphia Company, by its recent defaults, has sought to avoid." The court was also asked to appoint a receiver for Pittsburgh Railways and to require an accounting by the Philadelphia Company of the management of the railway company and subsidiary and affiliated companies.

### NO CAUSE FOR ACTION CLAIMED

Dismissal of the actions is asked by the defendants to both suits, on the grounds that the bills do not make out any cause of action against the defendants and that cause of action, if any, is vested in the Maryland Trust Company, trustee under the deed securing the general mortgage 5 per cent bonds of the United Traction Company.

In its reply to the Allen suit, the Philadelphia Company demands proof of the allegation in the complaint that a syndicate "caused \$17,000,000 par value of common stock to be issued and delivered to it without paying the United (United Traction Company) any real or cash value therefor.

The defendant company avers it purchased the stock referred to "in good faith and without knowledge of any alleged invalidity of said stock so issued or any part thereof."

The answer of the Pittsburgh Railways and the United Traction Company to the same suit, says:

"The defendants deny that \$3,000,000 par value of preferred stock was sold and the proceeds thereof together with the proceeds of the aforesaid bonds used to pay the purchase price of the properties acquired by the United, and the defendants deny that the \$17,000,000 par value of common stock was issued and delivered without giving to the United or its subsidiary companies any real or cash value therefor.

"Briefly, all the common capital stock of the United Traction Company of Pittsburgh was issued in payment for the properties known as the Second Avenue Traction Company; all the preferred stock and \$800,000 in cash was given in payment for the properties known as the Northside Traction Company, including the Federal Street & Pleasant Valley Passenger Railway and approximately \$2,500,000 in cash was given in payment for the capital stock of the Pittsburgh, Allegheny & Manchester Traction Company. There was thus a total cash disbursement of approximately \$3,300,000 which was realized by selling the mortgage bonds.

"It is further denied that the \$3,000,000 par value of preferred stock of the United Traction Company was or is owned by the Philadelphia Company."

## Further M. O. Negotiations

The directors of the London & Lake Erie Railway & Transportation Company, London, Ont., have decided to throw open all books to the inspection of Sir Adam Beck and the London & Port Stanley Railway Commission, and to make an offer to sell out to the city of London for \$420,000.

Some time ago the company made a move to sell to the city and asked Sir Adam Beck, who is chairman of the commissions in charge of the London & Port Stanley Railway and the Peterboro Radial Railway, both municipally operated, to name a price. Sir Adam answered that he would be prepared to recommend to the people that they pay \$286,000 for the road at which rate it would pay its way. The company wanted double that amount, however, and gave notice of intention to tear up the rails and scrap the line. The road is 28 miles long.

## "Going Value" Tax Overruled

Justice Black in the New Jersey Supreme Court has handed down an opinion in which he reduces the tax assessment of the Trenton & Mercer County Traction Corporation by \$568,052. This assessment on the "going value" of the company for the year 1916 was held legal by the State Board of Taxes and Assessments. Judge Black holds that "going value" cannot properly be included in appraising taxable value of property of public utility corporations. Frank S. Katzenbach, counsel for the company, argued against the arbitrary adding of this amount to the assessment by the State board as "going value" and characterized it as double taxation. The court holds that the "going value" was already taxed by a levy upon the gross receipts of the company.

## Report of Referee Ratified

**Each Non-Assenting Holder of \$1,000 of R. S. & E. Bonds Has \$346 Coming to Him**

The report of George H. Bond as referee in the foreclosure suit of the Columbia Trust Company, New York, N. Y., against Hendrick S. Holden and C. Loomis Allen as receivers of the Rochester, Syracuse & Eastern Railroad, Syracuse, N. Y., has been ratified by Justice Hubbs.

Mr. Bond's report shows that there were outstanding 44,897, \$1,000 first mortgage forty-year 6 per cent gold bonds, totalling \$4,897,000. The amount of principal and interest due on the mortgage on March 16, 1917, was \$5,656,368, so that \$1,115 was due on each \$1,000 bond.

The proceeds of the sale of the road were \$1,691,079. The reorganization committee composed of Arthur W. Loasby, Elbert Harvey and DeForest Settle received deposits of bonds to the amount of \$4,855,000. Owners of the bonds who participated in the reorganization received for each \$1,000 bond \$500 par value of first mortgage 5 per cent bonds, \$500 of 6 per cent cumulative preferred stock, \$100 of 6 per cent cumulative preferred stock for unpaid interest, and \$200 of common stock. By an order made by Justice Hubbs the amount of \$14,563 is to be set aside to make payments of \$346.76 on each of the forty-two bonds not participating.

## Preferred Dividend in Scrip

The directors of the American Public Utilities Company, Grand Rapids, Mich., have declared the usual quarterly dividend on the preferred stock of the company, payable in scrip on April 1. The scrip will be in the form of warrants, payable on or before April 1, 1923, bearing 6 per cent interest.

The directors of the company deem it prudent, in view of the very uncertain financial condition now prevalent, and which may continue during the war, to make payment of the dividend in scrip, instead of cash, in order to conserve the resources of the company and its subsidiaries. While not authorizing any unusual construction expenditures by the subsidiary companies, at the same time the directors feel that they must provide for the constant demands upon them for added service at existing plants, and as there is no certainty that funds for these unavoidable expenditures can be obtained through the sale of securities in the usual way, they must be taken from the earnings of the companies which ordinarily are devoted to the payment of dividends.

The earnings of the company, considering war conditions, are satisfactory, and while the dividend scrip is payable five years from date, it is not anticipated that the dividend payments will be deferred for that length of time. The time is set at five years more as a precautionary measure than anything else.

Electric Railway Statistics

Comparison of Returns for Year Ended Dec. 31, 1917, with Those for 1916 Shows Electric Railways To Be Disastrously Affected by Rising Costs

A comparison of electric railway statistics for the twelve months ended Dec. 31, 1917, with figures for the corresponding period of 1916, made by the information bureau of the American Electric Railway Association, brings out rather clearly the effect rising costs of materials and supplies used by electric railways, together with increases in wages and taxes, have had upon the railway companies net.

Data for the twelve months ended Dec. 31, 1917, representing 8437 miles of line of companies scattered throughout the country, indicate an increase in operating revenues of 5.77 per cent, in operating expenses, one of 12.78 per cent, and a decrease in net earnings of 5.91 per cent. Data representing 7005 miles of line indicate an increase in the amount of taxes paid of 13.87 per cent, while operating income decreased 10.04 per cent.

The operating ratio of the United States as a whole increased from 62.51 in 1916 to 66.65 in 1917. That of the Eastern district increased even more—from 62.46 in 1916 to 67.42 in 1917.

cent, the net earnings, as pointed out above, have decreased almost 6 per cent and the operating income decreased 10 per cent. It must also be borne in mind in this connection that both of the fare figures are based upon the combined returns of both city and interurban of revenue passengers per passenger car mile increased 3.55 per cent.

The returns from the city and interurban electric railway companies, as shown in detail in the appended tables, have been classified according to the following geographical grouping: Eastern District—East of the Mississippi River and north of the Ohio River. Southern District—South of the Ohio River and east of the Mississippi River. Western District—West of the Mississippi River.

Table I shows the revenues, expenses and net earnings of approximately 100 electric railways in the United States as well as the operating income of a slightly smaller number of companies reporting taxes. Difficulty in obtaining the needed data, together with the limited time after the close of the cal-

a whole, while the operating revenue of the three groups increased at a normal rate, operating expenses and taxes have increased tremendously. The operating expenses of the Eastern group, for instance, have increased 13.74 per cent and the taxes 14.33 per cent, while operating revenues increased by 5.3 per cent and the net earnings decreased 8.54 per cent.

Table II shows the details of the operating expenses of companies represented by 7127 miles of line. An examination of this table reveals what was perhaps to be expected—that the largest increases occur in the expenditure for "power" and for "conducting transportation"—that is, for coal and for labor. Due to measures of economy apparently there is but little increase in the expenditures for "maintenance of way and structure," while on the other hand, in order, it seems, to avoid buying new cars and thus release mill and plant facilities for the use of the government a great deal of car repairing has apparently been done, thus increasing the expenditure for this account by some 13 per cent. The "general and miscellaneous" account has also increased some 10 per cent. The largest increase in the "power" account has occurred in the Eastern district—one of 30.59 per cent, while the largest in the "conducting transportation" account was in the Western district, one of 11.02 per cent.

ONLY NORMAL INCREASE IN TRAFFIC

Table III gives the traffic statistics of companies, representing 6668 miles of line. All groups indicate normal increases in the number of passengers carried. The Eastern and Western indicate, moreover, slight increases in the car mileage and car hours run. The Western district shows the greatest percentage increase in both the number of revenue and the number of transfer passengers carried; the Southern, the least percentage increase in the number of transfer passengers carried. A number of companies keep no record of free passengers, and the records of free passengers as shown on the table are, therefore, somewhat smaller than the actual figures. Though net earnings have decreased the average fare per revenue passenger has increased slightly in all districts, and has also the average fare per passenger including transfers. The largest increase in the number of revenue passengers carried per revenue car mile has occurred in the Southern district.

In Table IV there are shown the revenues, expenses and net earnings per revenue car mile and per revenue car hour, together with the per cent increase or decrease over the corresponding figures for 1916. There are also given the number of revenue car miles and car hours involved with the last three figures omitted. For the United States as a whole the net earnings both per revenue car mile and revenue car hour show decreases of more than 4½ per cent.

TABLE IV—OPERATING REVENUES AND EXPENSES OF ELECTRIC RAILWAYS PER REVENUE CAR MILE, YEAR ENDED DEC. 31, 1917

Account	United States		Eastern District		Southern District		Western District	
	Amount 1917 (in cents)	Increase over 1916 per cent.	Amount 1917 (in cents)	Increase over 1916 per cent.	Amount 1917 (in cents)	Increase over 1916 per cent.	Amount 1917 (in cents)	Increase over 1916 per cent.
Per revenue car mile:								
Operating revenues.....	30.87	4.08	32.99	3.68	24.91	6.36	28.65	14.45
Operating expenses.....	20.06	9.68	21.45	11.49	14.90	7.74	18.90	6.60
Net earnings.....	10.81	†4.93	11.54	†8.27	10.01	4.38	9.75	0.52
Revenue car miles *.....	469,904,724		272,046,596		36,464,707		161,393,421	
Av. No. miles represented....	1917, 6,668; 1916, 6,609		1917, 4,447; 1916, 4,410		1917, 603; 1916, 595		1917, 1,618; 1916, 1,604	

OPERATING REVENUES AND EXPENSES OF ELECTRIC RAILWAYS PER REVENUE CAR HOUR, YEAR ENDED DEC. 31, 1917

Account	(In dollars)		(In dollars)		(In dollars)		(In dollars)	
	1917	1916	1917	1916	1917	1916	1917	1916
Per revenue car hour:								
Operating revenues.....	2.88	3.60	3.06	2.68	2.21	6.25	2.72	4.21
Operating expenses.....	1.87	8.72	1.99	10.56	1.32	7.32	1.80	6.51
Net earnings.....	1.01	†4.72	1.07	†9.32	0.89	4.71	0.92	....
Revenue car hours *.....	50,438,956		29,366,405		4,101,284		16,971,267	
Av. No. miles represented....	1917, 6,668; 1916, 6,609		1917, 4,447; 1916, 4,410		1917, 603; 1916, 595		1917, 1,618; 1916, 1,604	

\* The last three figures are omitted. † Decrease.

The operating ratios of the Western and Southern districts have also increased though not quite as much as that of the Eastern district.

The number of revenue passengers carried by companies represented by 6688 miles of line increased 4.91 per cent, while the number of transfer passengers increased 2.67 per cent, the revenue car mileage 1.28 per cent and the revenue car hours 1.95 per cent. Though the average fare per revenue passenger increased 0.79 per cent and the average fare per passenger including transfers increased 1.25 per

cent, the net earnings, as pointed out above, have decreased almost 6 per cent and the operating income decreased 10 per cent. It must also be borne in mind in this connection that both of the fare figures are based upon the combined returns of both city and interurban of revenue passengers per passenger car mile increased 3.55 per cent.

The returns from the city and interurban electric railway companies, as shown in detail in the appended tables, have been classified according to the following geographical grouping: Eastern District—East of the Mississippi River and north of the Ohio River. Southern District—South of the Ohio River and east of the Mississippi River. Western District—West of the Mississippi River.

Table I shows the revenues, expenses and net earnings of approximately 100 electric railways in the United States as well as the operating income of a slightly smaller number of companies reporting taxes. Difficulty in obtaining the needed data, together with the limited time after the close of the cal-

TABLE I—COMPARISON OF REVENUES AND EXPENSES OF ELECTRIC RAILWAYS FOR TWELVE MONTHS, JANUARY-DECEMBER, 1917 AND 1916

Account	United States				Eastern District				Southern District				Western District			
	Amount, January-December, 1917	Per Mile of Line			Amount, January-December, 1917	Per Mile of Line			Amount, January-December, 1917	Per Mile of Line			Amount, January-December, 1917	Per Mile of Line		
		1917	1916	% Increase		1917	1916	% Increase		1917	1916	% Increase		1917	1916	% Increase
Operating revenues	\$190,045,411	\$22,525	\$21,296	5.77	\$122,578,032	\$20,979	\$19,909	5.37	\$12,958,884	\$16,342	\$15,565	4.99	\$54,508,495	\$30,249	\$28,303	6.88
Operating expenses	126,663,441	15,013	13,312	12.78	82,636,305	14,143	12,435	13.74	7,560,872	9,535	8,899	7.15	36,466,264	20,236	18,090	11.86
Net earnings	63,381,970	7,512	7,984	5.91	39,941,727	6,836	7,474	8.54	5,398,012	6,807	6,666	2.12	18,042,231	10,013	10,213	1.96
Op. ratio, per cent.	1917, 66.65; 1916, 62.51				1917, 67.42; 1916, 62.46				1917, 58.35; 1916, 57.17				1917, 66.90; 1916, 63.91			
Aver. No. miles represented	1917, 8,437; 1916, 8,364				1917, 5,843; 1916, 5,793				1917, 793; 1916, 785				1917, 1,801; 1916, 1,786			

COMPANIES REPORTING TAXES

Operating revenues	\$159,546,552	\$22,776	\$21,653	5.19	\$100,122,719	\$20,568	\$19,643	4.71	\$9,300,508	\$17,255	\$16,546	4.29	\$50,123,325	\$31,366	\$29,504	6.31
Operating expenses	105,265,068	15,027	13,378	12.33	66,311,138	13,622	12,079	12.77	5,313,141	9,857	9,097	8.35	33,640,789	21,052	18,783	12.08
Net earnings	54,281,484	7,749	8,275	6.26	33,811,581	6,946	7,564	8.17	3,987,367	7,398	7,449	0.68	16,482,536	10,314	10,721	3.80
Taxes	10,175,689	1,453	1,276	13.87	5,904,587	1,213	1,061	14.33	776,558	1,441	1,321	9.08	3,494,544	2,187	1,915	14.20
Operating income	44,105,795	6,296	6,999	10.04	27,906,994	5,733	6,503	11.84	3,210,809	5,957	6,128	2.79	12,987,992	8,127	8,806	7.71
Op. ratio, per cent.	1917, 65.98; 1916, 61.78				1917, 66.23; 1916, 61.49				1917, 57.13; 1916, 54.98				1917, 67.12; 1916, 63.66			
Aver. No. miles represented	1917, 7,005; 1916, 6,939				1917, 4,868; 1916, 4,824				1917, 539; 1916, 533				1917, 1,598; 1916, 1,582			

† Decrease.

TABLE II—DETAILS OF OPERATING EXPENSES OF ELECTRIC RAILWAYS FOR THE YEAR ENDED DEC. 31, 1917

Account	United States				Eastern District				Southern District				Western District			
	Amount, January-December, 1917	Per Mile of Line			Amount, January-December, 1917	Per Mile of Line			Amount, January-December, 1917	Per Mile of Line			Amount, January-December, 1917	Per Mile of Line		
		1917	1916	% Increase		1917	1916	% Increase		1917	1916	% Increase		1917	1916	% Increase
Operating expenses	\$101,484,369	\$14,239	\$12,794	11.29	\$63,413,346	\$13,344	\$11,794	13.14	\$7,560,872	\$9,535	\$8,899	7.15	\$30,510,15	\$19,286	\$17,734	8.75
Way and structures	10,975,589	1,540	1,517	1.52	6,902,025	1,452	1,405	3.35	869,005	1,096	1,067	2.72	3,204,559	2,026	2,079	2.55
Equipment	9,656,177	1,355	1,191	13.77	5,517,656	1,161	1,005	15.52	780,968	985	958	2.82	3,357,553	2,122	1,863	13.90
Total maintenance and renewal *	26,665,973	3,742	3,503	6.82	16,878,720	3,552	3,280	8.29	1,649,973	2,081	2,025	2.77	8,137,280	5,144	4,908	4.81
Power	17,017,376	2,388	1,921	24.31	11,464,145	2,412	1,847	30.59	1,091,279	1,376	1,120	22.86	4,461,952	2,820	2,540	11.02
Conducting transportation	42,731,134	5,995	5,440	10.20	25,980,476	5,467	4,973	9.93	3,621,633	4,576	4,227	8.04	13,129,025	8,299	7,449	11.41
Traffic	324,227	45	55	18.18	110,702	23	40	42.50	45,258	57	61	6.56	168,267	106	96	10.42
General and miscellaneous	14,796,610	2,076	1,882	10.31	8,980,554	1,890	1,654	14.27	1,152,729	1,454	1,466	0.82	4,663,327	2,948	2,774	6.27
Transportation for investment—Cr.	†50,951	†7	†7	.....	†1,251	.....	.....	.....	.....	.....	.....	.....	†49,700	†31	†33	.....
Aver. No. miles represented	1917, 7,127; 1916, 7,057				1917, 4,752; 1916, 4,702				1917, 793; 1916, 786				1917, 1,582; 1916, 1,569			

\* Contains an amount not apportioned between "Maintenance of Way and Structures" and "Maintenance of Equipment." † Decrease.

TABLE III—TRAFFIC STATISTICS OF ELECTRIC RAILWAYS FOR THE YEAR ENDED DEC. 31, 1917

Account	United States				Eastern District				Southern District				Western District			
	Amount January-December, 1917 (in thousands)	Per Mile of Line			Amount January-December, 1917 (in thousands)	Per Mile of Line			Amount Jan'y-December, 1917 (in thousands)	Per Mile of Line			Amount January-December, 1917 (in thousands)	Per Mile of Line		
		1917	1916	% Increase		1917	1916	% Increase		1917	1916	% Increase		1917	1916	% Increase
Passenger revenue	\$138,466	\$20,766	\$19,667	5.59	\$84,505	\$19,003	\$18,061	5.22	\$8,836	\$14,654	\$13,975	4.86	\$45,125	\$27,889	\$26,193	6.48
Revenue car miles—total	469,905	70,472	69,579	1.28	272,047	61,175	60,426	1.24	36,465	60,472	61,529	1.72	161,393	99,749	97,729	2.07
Passenger car miles	464,319	69,634	68,743	1.30	267,542	60,162	59,430	1.23	36,154	59,957	60,902	1.55	160,623	99,273	97,260	2.07
Other revenue car miles	5,586	838	836	0.24	4,505	1,013	996	1.71	311	515	627	17.86	770	476	469	1.49
Revenue car hours—total	50,439	7,564	7,419	1.95	29,366	6,604	6,458	2.26	4,101	6,801	6,905	1.51	16,971	10,489	10,253	2.30
Passenger car hours	49,732	7,458	7,311	2.01	28,788	6,474	6,327	2.32	4,056	6,727	6,815	1.29	16,887	10,437	10,200	2.32
Other revenue car hours	707	106	108	1.85	578	130	131	0.76	45	74	90	17.78	84	52	53	1.89
Passengers—total	3,448,065	517,106	495,231	4.42	2,049,501	460,873	442,634	4.12	213,37	353,855	340,538	3.91	1,185,190	732,503	697,222	5.06
Revenue passengers	2,706,276	405,860	386,875	4.91	1,663,949	374,173	358,277	4.44	174,544	289,462	276,531	4.68	867,782	536,330	506,433	5.90
Transfer passengers	706,990	106,027	103,270	2.67	364,183	81,894	79,795	2.63	34,546	57,289	55,950	2.39	308,262	190,520	185,365	2.78
Free passengers	34,799	5,219	5,086	2.62	21,369	4,806	4,562	5.35	4,283	7,104	8,057	11.83	9,146	5,653	5,424	4.22
Average fare per passenger																
Per revenue passenger	*5.12			0.79	*5.08			0.79	*5.06			0.20	*5.20			0.58
Per passenger (including transfers)	*4.06			1.25	*4.17			1.21	*4.23			0.71	*3.84			1.32
Average number of revenue passengers per passenger car mile	5.83			3.55	6.22			3.15	4.83			6.39	5.40			3.65
Aver. No. miles represented	1917, 6,668; 1916, 6,609				1917, 4,447; 1916, 4,410				1917, 603; 1916, 595				1917, 1,618; 1916, 1,046			

† Decrease. \* Cents.



## Financial News Notes

**Foreclosure Sale on March 30.**—The property of the Northern Cambria Street Railway, Patten, Pa., which operates an electric railway 15 miles in length, will be sold on March 30 by the trustee, the Cambria Title Savings & Trust Company, Ebensburg, Pa.

**Northern States Issues Additional Bonds.**—A syndicate composed of Harris Trust & Savings Bank, Chicago; H. M. Bylesby & Company, Chicago; Guaranty Trust Company, New York, and Bonbright & Company, New York, is offering \$1,000,000 Northern States Power Company first and refunding mortgage 5 per cent bonds, due on April 1, 1941.

**Foreclosed Road Transferred.**—The Orleans-Kenner Electric Railway has been transferred to the Orleans-Kenner Traction Company, Inc., New Orleans, La., as a result of the recent receivers' sale, when J. Blanc Moore bought the property for the reorganized company. The line is about 16 miles long, from New Orleans to Kenner, La., this including 4 miles operated under a track-age agreement.

**San Diego Sale Authorized.**—The California Railroad Commission has made final its authority granted last November to the San Diego & South Eastern Railway to sell its physical assets and properties to the San Diego & Arizona Railway, San Diego, Cal., the consideration of \$1,500,000 to stand on the books of the purchasing corporation as an indebtedness due to the selling company, with interest at 6 per cent, until such time as bonds authorized to be issued in payment have been delivered.

**Receivership Application Denied.**—Application for appointment of a receiver for the Trenton, Lakewood & Seacost Railway, Trenton, N. J., has been denied by Vice-Chancellor Foster. The application was made by Frank Tilford, New York, who claimed that the company had no income and that conservation of interests of bond and stockholders demanded the naming of a receiver. The company was formed to build a line from Trenton to Point Pleasant, a distance of about 40 miles. No construction work was ever done.

**Ohio Commission Authorizes Abandonment.**—One division of the Interurban Railway & Terminal Company, Cincinnati, Ohio, will be abandoned under an order of the Public Utilities Commission issued on March 20. The portion abandoned lies between Coney Island, Hamilton County, and Bethel. It is known as the Bethel division. Its receipts last year were \$7,000 less than the operating expenses. This division is paralleled between Amelia and Bethel by the Cincinnati, Georgetown & Portsmouth Railroad. For the remaining 6 miles the roads are from 2 to 3 miles apart, but the commission found that fair service can be given by the other road, even in this district.

**Cincinnati-Dayton Line Reorganized.**—The Ohio Public Utilities Commission on March 20 issued an order approving the reorganization of the Cincinnati, Dayton & Toledo Traction Company under the name of the Cincinnati & Dayton Traction Company. The new company will have a capital stock, all common, of \$1,250,000 and is authorized to issue \$4,750,000 of bonds. The capital liabilities of the old company amounted to \$7,250,000. J. M. Hutton and company and Claude Ashbrook, brokers, Cincinnati, with other interests, took a leading part in the reorganization which was effected in behalf of a bondholders' committee. Attorney Judson Harmon, former Governor, conducted the legal proceedings. The Cincinnati, Dayton & Toledo Trac-

tion Company is operated as a part of the Ohio Electric Railway. The line extends from Cincinnati to Dayton.

**Option Secured on Abandoned Road.**—Announcement has been made by George H. Taylor, personal representative of Frank J. Gould, president of the Richmond & Chesapeake Bay Railway, Richmond, Va., that a thirty-day option to buy the road has been granted to T. Garnett Tabb, president of the Hermitage Country Club, Inc., who voiced his intention of purchasing the property with a view of restoring the service between Richmond and Ashland at the earliest possible date. Mr. Taylor said: "It was never the intention of Mr. Gould to scrap this property, and how such a report could have started is beyond me. We are all interested in seeing service restored on the Richmond & Chesapeake Bay Railway, and before we granted the option to Mr. Tabb he expressed his purpose of intending to buy with a view of operating."

**I. T. S. Passes Common Dividend.**—The Illinois Traction Company, Peoria, Ill., has announced that the quarterly dividend of three-quarters of 1 per cent on the common stock, starting with that due on May 15, will be passed owing to abnormal conditions due to the war. The regular quarterly dividend of 1½ per cent on the preferred stock has been declared and will be paid on April 1. The company has \$12,330,800 of common stock and \$7,289,500 of preferred stock outstanding. In an official statement the company says that the cost of coal, labor and every material entering into the production of electric, gas and all utility service has mounted to such a degree during the past year that it applied to the Illinois Public Service Commission for an emergency increase in city utility rates partly to counteract the effect of war prices. The hearings in this case have been reviewed in the *ELECTRIC RAILWAY JOURNAL*. The case has been closed and is before the commission for decision.

## Electric Railway Monthly Earnings

BATON ROUGE (LA.) ELECTRIC COMPANY					
Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan., '18	\$21,529	\$*11,117	\$10,412	\$3,695	\$6,717
1m., Jan., '17	20,445	*9,977	10,468	3,565	6,903
12m., Jan., '18	233,048	*120,553	112,495	42,866	69,629
12m., Jan., '17	214,312	*101,634	112,678	42,070	70,608
CLEVELAND, PAINESVILLE & EASTERN RAILROAD, CLEVELAND, OHIO					
1m., Dec., '17	\$42,943	\$*29,133	\$13,810	\$11,564	\$2,245
1m., Dec., '16	40,499	*22,481	18,018	11,723	6,295
12m., Dec., '17	539,107	*339,045	200,062	140,038	60,024
12m., Dec., '16	466,604	*263,168	203,436	137,414	66,022
COLUMBUS (GA.) ELECTRIC COMPANY					
1m., Jan., '18	\$108,978	\$*41,606	\$67,372	\$31,893	\$35,479
1m., Jan., '17	89,607	*33,181	56,426	28,520	27,906
12m., Jan., '18	1,115,436	*428,885	686,551	362,475	324,076
12m., Jan., '17	899,013	*353,668	545,345	343,407	201,938
EL PASO (TEX.) ELECTRIC COMPANY					
1m., Jan., '18	\$114,360	\$*74,781	\$39,579	\$6,513	\$33,066
1m., Jan., '17	116,343	*65,144	51,199	5,245	45,954
12m., Jan., '18	1,281,542	*811,408	470,134	68,276	401,858
12m., Jan., '17	1,121,778	*675,140	446,638	59,700	386,938
FEDERAL LIGHT & TRACTION COMPANY, NEW YORK, N. Y.					
1m., Jan., '18	\$310,344	\$*212,003	\$98,341	\$50,184	\$48,157
1m., Jan., '17	243,878	*150,265	93,613	49,727	43,886
12m., Jan., '18	2,933,776	*2,072,203	861,573	594,912	266,661
12m., Jan., '17	2,520,477	*1,636,654	883,823	587,017	296,806
GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.					
1m., Jan., '18	\$194,182	\$*132,913	\$61,269	\$39,282	\$21,989
1m., Jan., '17	163,075	*113,216	49,859	36,910	12,947
12m., Jan., '18	2,119,228	*1,404,568	714,660	453,252	261,408
12m., Jan., '17	1,951,476	*1,243,222	708,254	439,312	268,942
HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.					
1m., Jan., '18	\$29,422	\$*20,554	\$8,868	\$5,075	\$3,793
1m., Jan., '17	28,753	*18,683	10,070	5,225	4,845
12m., Jan., '18	343,802	*218,322	125,480	61,150	64,330
12m., Jan., '17	330,315	*188,101	142,214	63,618	72,596
LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO					
1m., Dec., '17	\$167,571	\$*107,350	\$60,221	\$39,336	\$20,885
1m., Dec., '16	149,815	*97,916	51,899	36,558	15,341
12m., Dec., '17	1,786,011	*1,210,690	575,321	421,333	153,988
12m., Dec., '16	1,818,551	*1,022,712	595,839	436,647	159,192
NEW YORK (N. Y.) RAILWAYS					
1m., Dec., '17	\$918,775	\$*762,955	\$155,820	\$282,419	†\$66,918
1m., Dec., '16	946,071	*799,387	146,684	279,411	†\$64,089
6m., Dec., '17	6,306,105	*4,699,063	1,608,042	1,691,167	†\$25,567
6m., Dec., '16	5,393,560	*4,185,894	1,207,666	1,690,097	†\$144,505
PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.					
1m., aJn., '18	\$960,089	\$*588,004	\$372,085	\$204,491	\$167,594
1m., Jan., '17	787,869	*471,237	316,632	191,925	124,707
12m., Jan., '18	9,627,081	*5,970,786	3,656,295	2,363,754	1,292,541
12m., Jan., '17	8,225,647	*5,160,961	3,064,686	2,222,257	842,429

\*Includes taxes. †Deficit. ‡Includes non-operating income.



# Traffic and Transportation

## "Pup" Talks at Durham

Problems of Utility Frankly Set Forth  
in Series of Advertisements  
Addressed to Public

A novel and effective series of newspaper advertisements has recently been concluded by the Durham (N. C.) Traction Company in connection with its request to the city for a 6-cent fare and relief from certain franchise provisions which the company regards as unduly burdensome. The publicity program was in charge of J. Frank Johnson.

The Durham advertisements were run in fifteen consecutive issues of both the afternoon and morning newspapers, and were popularly known as the "Pup" series because each was headed by a picture of an agonized canine seated on a tub with forepaws in a begging attitude, while a huge chain bound him firmly to a large stake. The readers' wonderment as to this symbolism was permitted to continue for six advertisements, and the public learned that "Pup" meant "Public Utility Problems," and it was apparent the dog represented the Durham Traction Company, piteously begging for relief from the bonds of obsolete city regulations.

All the advertisements were instructive, frankly setting forth the company's difficulties in an abnormal period while operating and construction costs were often trebled and quadrupled. One of the best appeals was advertisement No. 4, published on Feb. 13. It is reproduced in full as follows:

### "SO THAT PEOPLE MAY KNOW

"One of the principal benefits that a community derives from any company or industry which does business in it, is the amount of money which that company spends in the community.

"We are not in position to state definitely just how our figures of total expenditures, and expenditures within the city of Durham, compare with those of other industries.

"We want, however, to give our figures of expenditures in 1917.

"For the 312 business days during the year the Durham Traction Company spent an average of \$1,794 a day during the year of 1917.

"Of this \$1,794 a day, \$917 was spent in the city of Durham, of which \$260 was spent daily for material and miscellaneous expenses.

"These figures are not superficial or padded, but are taken directly from our check register.

"Furthermore, they must vary directly with the conditions of the company.

"Our prosperity, due to fare earnings, will increase both these items.

"If we are forced to seek economies

we cannot be progressive and these items must be decreased.

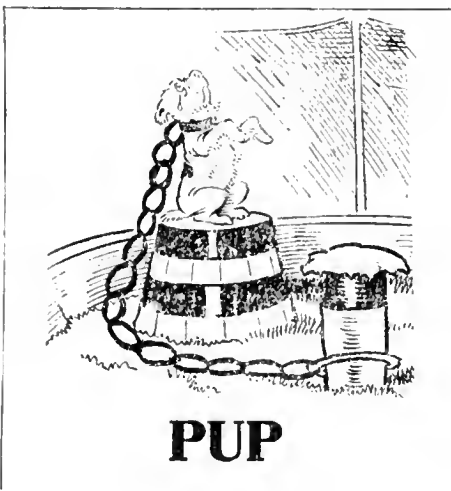
"Which is better for you?

"Which is better for Durham?

"Efficient Utility service can be furnished to the public only by a successful company.

"Companies that barely earn enough to meet their expenses are constantly forced to seek economies, and service must suffer in consequence.

"History teaches that a city is best served by a utility that is prosperous;



PUP

THE DURHAM APPEAL

one that can expend; one that can make extensions; one that can, because of available funds, give service in every sense of the word; one that can employ men of sterling quality.

"Isn't it true that successful cities and successful utilities go hand in hand.

"A bankrupt or poorly paying public utility is one of the worst advertisements a city can have.

"Write us that criticism about which you have been thinking."

## Cleveland Fare Request In

President Stanley Wants Highest Rate  
Under Tayler Grant Put  
Into Effect

In a letter to Fielder Sanders, City Street Railway Commissioner, dated March 21, John J. Stanley, president of the Cleveland (Ohio) Railway, asked that the City Council assent to an increase in the rate of fare to the highest figure named in the Tayler grant, which is 4 cents cash and seven tickets for a quarter, with 1 cent for a transfer and no rebate. This is known as rate A in the franchise. If the increase is granted, rate B, which differs from rate A only in providing a rebate of the transfer charge, would be skipped entirely.

Mr. Stanley's letter stated that the receipts for February were \$49,413 less than the cost of operation and that the interest fund, which should normally be somewhere between \$300,000 and \$500,000, is now only \$120,846. Council will consider this matter, but under the franchise the rate could be raised automatically one step at a time until it reaches A, because the interest fund is below the prescribed \$300,000. A question that is interesting most people is whether even this rate will be sufficient to restore the fund and keep the service at its present efficiency.

To complicate matters the motormen and conductors are talking of a large increase in wages when their contract expires on May 1.

## Confer on Freight

Governor at Meeting in Ohio at Which  
Handling of Freight on Electric  
Railways Is Considered

A meeting of representatives of Ohio interurban railways was held in Columbus on March 21 for the purpose of discussing ways and means of handling more freight in less than carload lots and in short hauls in order to relieve the steam roads of a portion of the burden that has been placed upon them. Governor James M. Cox attended the meeting and made a brief address covering the possibilities of the electric lines in giving needed relief.

The greatest difficulty these roads will have in meeting the wishes of the government, according to some of the representatives present, is the lack of proper freight equipment and terminal facilities. It was also suggested that the carrying capacity would have to be greatly increased and that this would be almost impossible without government aid.

It was decided, however, to make a survey of the amount of freight handled last year by Ohio roads, the possible amount that can be handled this year, the requirements in the way of additional equipment needed to utilize all present available power and methods for physical connection with the steam roads. These data will be referred to Secretary McAdoo. The committee appointed to make the survey consists of the following:

F. W. Coen, president of the Central Electric Railway Association and vice-president and general manager of the Lake Shore Electric Railway, Cleveland; F. D. Carpenter, president the Western Ohio Railway, Lima; H. G. Gilpin, general manager the Ohio Electric Railway, Springfield; and E. F. Schneider, general manager the Cleveland, Southwestern & Columbus, Cleveland.

In Ohio there are 2607 miles of main line and 87 miles of branch and spur tracks. The meeting was held with J. B. Dugan, chief inspector of the Public Utilities Commission, who has given this matter much thought and attention.

## Review of Six New York Fare Cases

### A Summary Is Presented of the Testimony in Connection With Rate Applications Heard Recently by Up-State Commission

The Public Service Commission for the Second District of New York has held hearings recently on a number of applications by electric railways for increased fares. As a matter of convenience to its readers, the *ELECTRIC RAILWAY JOURNAL* has decided to summarize the results of the hearings under one head, but to keep the review of the proceedings in each case separate from the others.

#### SERVICE FIRST—FARES NEXT

The application of the Poughkeepsie & Wappingers Falls Railway for a 6-cent fare was heard on March 21. The railroad presented detailed figures to the commission in support of its application. Counsel for the city said that if the commission found from the evidence that it was necessary to increase the fare the city did not intend to object. The city claimed, however, that it had not received proper service and treatment from the railroad. If an increase was granted the city wanted proper service.

H. C. Hopson, for the company, said the application of the railroad was for a 6-cent fare in Poughkeepsie and a finding by the commission that it was entitled to a similar increase on the balance of its system. He said there were no franchise questions involved in the application. The railroad runs between Poughkeepsie and Wappingers Falls, operating over the Central New England Railway to the Poughkeepsie State Hospital.

H. R. Guernsey, representing Vassar College, read an agreement between the City Railroad, Poughkeepsie, and Vassar College covering the fare for passengers to that school. The agreement was dated June 17, 1893, when the motive power was changed to electricity. It provided for a 5-cent fare.

"Then if the city gets good service, it is willing to pay for it," asked Chairman Hill of the Public Service Commission after Corporation Counsel Worral had made his statement in behalf of the city.

"Yes, sir," replied Alderman D'Arcy. "All we ask is good, fair service."

"There is nothing fairer than that," replied Chairman Hill.

#### THE CASE FOR THE COMPANY

The railway put in its evidence through Charles A. Brooks, local manager; J. A. Nilan, auditor; Joseph K. Choate, vice-president, and Charles A. Greenidge, chief engineer for J. G. White & Company, New York, operating managers of the railroad; and John M. Daly, New York, an expert accountant. It was shown that the company's net loss for 1917 was \$5,970 and that it had paid no dividends.

The evidence of Mr. Brooks was to the effect that the service, as far as operation was concerned, was good, but

that the roadbed and equipment of the company were not in good shape. He said that if the company was permitted to increase its rates there would be 1-cent increase in the fare zones outside of Poughkeepsie. Mr. Brooks also testified to increases in the cost of materials and wages paid conductors and motormen. The greater part of the evidence consisted of detailed statements of operating expenses, costs, etc., which were made a part of the record without objection.

There was no evidence given on the part of the city and the case was ordered closed by the commission.

#### COMMISSION ACTION ON OTHER APPLICATIONS

The rate applications of the Peekskill Lighting Company, and the Putnam & Westchester Traction Company, under a petition for a rehearing by the city of Peekskill, came up before the commission, on March 21. The city did not care to submit any evidence and the hearings were closed.

On March 21 the commission ordered closed the complaints against the Buffalo, Lockport & Rochester Railway protesting proposed increase in commutation passenger fares, the operation of which was ordered suspended by the commission, pending a hearing. The increase objected to was from 1 to 1½ cents a mile for commutation ticket books. The company filed a petition to withdraw the tariff, and this action was satisfactory to the complainants who consented to the withdrawal. The company, on not less than one day's notice to the public and under an effective date not later than April 15, is permitted to file a new tariff.

On March 19 the commission heard the application of the Fonda, Johnstown & Gloversville Railroad for permission to increase the fare charged passengers riding within the limits of a city or incorporated village, to 6 cents and a proportionate increase in rates for other transportation. City Attorney Wesley H. Maider of Gloversville, asked for a dismissal of the petition on the ground that there were certain franchise agreements. This was denied. Mr. Maider also asked for a postponement of the hearing until an adjudication by the Court of Appeals in the Rochester case. Chairman Hill said there would be no decision in rate cases until the Court of Appeals had rendered its decision. He said an early decision was expected. He said it was best to go ahead and permit the petitioner to put in its case. He thought that this course would be an advantage to those in opposition to the company's petition. The railroad then began the introduction of documentary evidence. This dealt largely with cost of operation and other statistics in support of the petition for an increased rate.

Another case heard recently by the commission was that of the Westchester Street Railway for permission to increase its rates.

Lucius S. Storrs, vice-president of the road, asserted that the company was unable to borrow in the open market because of the poor credit of the company and its poor earning condition. Unless the company was granted permission to increase its rates the company would have to stop operation or allow some one else to run the road. Mr. Storrs said that the petition for increased rates was to pay operating expenses and interest on bonds.

E. F. McKinley, who conducted the hearing for the company, said that the railway had never paid a dividend. In fact it had been a liability from the start. The deficit from 1910 to December 31, 1916, was \$111,000. For 1917 the deficit was about \$106,000. J. K. Funderford, general manager, and T. J. McGreevey, assistant auditor, also testified for the company.

The New York & Stamford Railway's application for permission to increase its fare to 6 cents was heard by the commission on March 15. Briefs will be filed later.

## Philadelphia Service Order

### Public Service Commission Directs Philadelphia Rapid Transit Company to Make Alterations

The Public Service Commission of Pennsylvania on March 25 ordered the Philadelphia Rapid Transit Company to make important improvements, alterations, additions and extension to its service and facilities. The order was made as a result of the hearings growing out of the complaints of the city of Philadelphia. William H. Robinson, Fox Chase Improvement Association, North Philadelphia Business Men's Association, Inc., and the United Business Men's Association of Philadelphia.

The commission orders the company to purchase on or before Dec. 1, 1919, 100 new cars of the larger type. Following the cessation of the war the company is directed to purchase new cars annually. On or before June 1, additional facilities for West Philadelphia must be provided, including new lines and double-tracking of several streets, additional cars on the Sixtieth Street line, a new line on Fifty-sixth Street, and resetting the Kensington tracks.

The company is directed to instruct its employees no longer to run past passengers, and it is suggested to the City Councils that an ordinance be passed to prevent the blocking of cars by vehicles unloading between the curb and the track.

The company made a statement in part as follows:

"The company will at once take steps to carry out the letter and spirit of the orders and recommendations therein contained. The company is gratified that the complaints against the serv-

ce, to quote from the commission, 'relate almost entirely to the past few months,' during which period the commission states that it recognized 'to the full the difficulties under which all transportation companies of every kind are and have been laboring.'

"Government demands are bringing to the city a largely increased population which must be cared for. The same conditions which call for increased service have necessarily put a stop to the completion of the city's system of high-speed lines which was designed to meet the very material growth in industrial enterprise which Philadelphia is now experiencing.

#### COMPANY MUST HAVE CO-OPERATION

"The task thus presented to the company can be successfully met only if it secures the co-operation of the public, which the commission points out is so much to be desired and the further assistance of the administration in giving the company a clear track which the commission earnestly recommends to the Mayor and Councils. In this connection it is only fair to say that much of the improvement in service experienced during the past month has been due to the increased coöperation of the city's traffic squad in preventing unnecessary delays and dragging of cars by other conveyances and so enabling the company to maintain its schedules."

## Service Order Issued

### New York Commission Orders Changes in Service of Line Between Buffalo and Rochester

The Public Service Commission of the Second District of New York has passed upon the complaints of citizens of Brockport, Spencerport and vicinity against the Buffalo, Lockport & Rochester Railway. The order of the commission directs the railway:

1. To clean the inside of its cars thoroughly at least once each day and to sweep out its cars at the end of each trip.
2. To keep its tracks in a safe condition and to repair its road between Rochester and Brockport.
3. To prevent passengers from riding in the front vestibule of any car or in the compartment occupied by the motorman.
4. To run eastbound trains 4, 10 and 12 double each day of the week except Sunday between Brockport and Rochester, and westbound trains 25 and 29 double each day of the week except upon Saturday, between Rochester and Brockport.
5. To run trains Nos. 15, 17 and 19 double on Saturdays between Rochester and Brockport.
6. To substitute service equivalent to that hereinbefore directed to be furnished provided the character of such service shall be first approved by this commission.

## State Controlled Utilities Trust Suggested

### Federal Trustee of Rhode Island Company Suggests One Big Corporation to Run All the Public Service Businesses in the State

At the meeting of the legislative committee which is considering the Rhode Island Company situation, John O. Ames, one of the five federal trustees in charge of the property under the New Haven Railroad dissolution decree, declared it to be his personal opinion that the solution of the public service corporation problem lay in the formation of what might be called a State-controlled "public service trust." Mr. Ames said:

"It is my opinion that the public service question could best be settled by the formation of one big corporation to run all of the public service businesses, such as electric railways, gas and electric companies. This corporation should be a private concern, but all of its functions should be absolutely controlled by the State through a special commission of the best men obtainable. The capitalization, financing, and operation of the properties should be controlled by the State and the return permissible should be fixed."

John P. Farnsworth and Charles C. Mumford, other Federal trustees, subscribed to that proposal. Rathbone Gardner, another trustee, declared that he was an advocate of State ownership. Mr. Green, the fifth trustee, was not present.

Representative Jennings of the committee stated that the controversy appeared to have settled down to a question of whether the State should allow the company to establish the modified zone system recommended by the special commission, or establish a flat 6-cent fare, which the special commission declared unjust and not desirable.

Duff F. Sherman, former vice-president of the Rhode Island Company, stated that the capital stock of the Rhode Island Company was \$9,685,500, all outstanding, and that to his knowledge all of the stock had been sold for cash.

#### NEW HAVEN COMPANY MILKED

John P. Farnsworth, discussing a question of "watered stock," said:

"The only graft was when the New Haven Railroad paid about \$19,000,000 for the Rhode Island Company, at a time when it was worth very much less. This was milk taken from the New Haven Railroad, but it was not water added to the Rhode Island Company."

Mr. Ames presented figures to show that for 1918 the estimated deficit of the company would be between \$700,000 and \$750,000. At a previous meeting C. A. Babcock, the comptroller, had said that it would probably run more than \$1,000,000. Mr. Ames said that Mr. Babcock based his figure on the deficit for January of this year, which was \$90,000. The deficit in the summer months would probably be less than the deficit in January, and for that reason Mr. Ames believed \$750,000 was a proper estimate.

Mr. Sherman, who promoted and constructed the Providence & Danielson Railway and sold it to the Rhode Island Company, stated that \$30,000 a year should be credited to that line for business done on the city lines directly caused by the existence of the Danielson line. If this were done there would be a profit of \$17,000 for 1917, instead of a deficit. This statement is contrary to the report of the engineering experts to the report of the special commission.

#### REPORT MUST BE IN BY APRIL 3

The General Assembly extended from March 26 to April 3 the time within which the legislative committee is directed to report a plan for aiding the electric railways, if such aid is found just.

The hearings that are now being held followed the action of the Legislature in preventing the Public Utilities Commission from carrying into effect the new fare rates established as just and equitable for the company by a special commission created a year ago for that particular purpose. That commission ordered the adoption of a system with 5-cent central areas and recommended taxation and franchise reforms.

## A. L. Drum and H. H. Easterly Named

### Organization Effected to Solve Transportation Difficulties Connected With Housing Problems

A. L. Drum, of A. L. Drum & Company, consulting and construction engineers, Chicago, Ill., has been retained by the Shipping Board, with H. H. Easterly, of the same company, as assistant, to solve some of the transportation difficulties of the housing problems in connection with the building of ships by the government.

Mr. Easterly has arrived in Washington to take up this work, and it was expected that Mr. Drum would reach Washington on April 1. Mr. Drum and Mr. Easterly will report to J. Rogers Flannery, director of housing for the Shipping Board, and work has already begun on solving some of the housing problems in connection with transportation on the Atlantic Coast. The scope of the work will be broadened later on, when the studies now being made are farther advanced, and when questions concerning appropriations are settled. At the office of Mr. Drum in Washington, it is stated that he has been "appointed to make investigations in regard to transportation by steam, electric railway and boat service."

The first investigations under way have been in the Hog Island and New-ark Bay districts.

## Compromise Likely

**Public Service Commission and Brooklyn Rapid Transit Company May Agree on Schedule Order.**

The basis of an agreement with reference to the acceptance by the Brooklyn Rapid Transit Company of the order requiring the posting of the schedules for all surface lines in Brooklyn, was reached between representatives of the company and the Public Service Commission at a conference on March 15 in the office of Public Service Commissioner F. J. H. Kracke.

The conference was requested by the railroad on March 6. The various phases of the order were thoroughly discussed. J. J. Dempsey, vice-president, speaking for the Brooklyn companies, assured the commission of his readiness to comply with any order which would serve to facilitate surface car operation. He asked further discussion on certain details of operation.

The suggestion upon which the agreement probably will be worked out was made by the commission. It intimated that the company could absorb the order gradually, applying it on certain specified lines first and then extending it to the entire system.

The order calls for the filing with the commission of definite schedules for the operation of each one of the seventy-five surface lines in Brooklyn. The company representatives declared several seasonal schedules were in use, and pointed out that a single schedule could not well cover the flexible operation necessary for vacation and holiday traffic.

The order of the commission was referred to in the *ELECTRIC RAILWAY JOURNAL* for March 9, page 481, and the protest of the company in the issue of March 16, page 543.

## Helping the Seattle Shipyards

Increased transportation facilities for the shipbuilding and industrial districts at Seattle, Wash., have been assured through the efforts of the King County Council of Defense at Seattle. On petition of the Council, the United States Shipping Board has approved the plan for operation of steam trains along the waterfront and to the end of the East Marginal way trackage at the south city limits, and the director of railroads has been authorized to establish such a service. Steam service will be employed during hours when shipyard employees need it and, in addition, a new ferry service will be established. The Puget Sound Traction, Light & Power Company has adopted certain recommendations of the Council of Defense, and has made improvements to the service. It is stated that the electric railway service to this district is now as satisfactory as it can be made without the construction of extensions.

## Six-Cent Fare Sought in Charleston

Six-cent fares are desired by the Charleston Consolidated Railway & Lighting Company, Charleston, S. C., and a petition for the increase has

been filed with the City Council. In addition to this the company has asked the City Council for an increase in the price of gas from \$1 to \$1.10 per 1000 cu. ft.

It was not the intention of the company to ask for an increase in fare at this time, but recently the trainmen made it plain that they could not work further for the company unless their wages were increased. The company took the position that it was conducting the railway business at a loss and could not afford to pay the men a higher scale. It was, therefore, decided to petition Council for permission to charge a 6-cent fare. This, the company figures, will actually yield about a 12½ per cent increase in gross income from the railway.

## Transportation News Notes

**Beeler Report on Staggered Hours Finished.**—John A. Beeler has completed the section of his Washington report relating to staggered hours of business and copies have been submitted to the Senate and House Committees. It is expected that the report will be made public some time during the week commencing April 2.

**Quebec Would Increase Fares.**—The Quebec Railway, Light & Power Company, Quebec, Que., has applied to the City Council for permission to increase its railway fares. The company wishes to sell tickets as follows: Extra tickets for workers, five tickets for 25 cents, ten tickets for 25 cents for school children only, 1 cent for each transfer, children not in arms to pay. The company will also sell twenty-one tickets for \$1.

**Ohio Road Asks for Higher Fares.**—On March 20 Attorney J. W. Heintzman filed with the Public Utilities Commission of Ohio an application asking for an increase in the rates of fare for the Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio. The commission has held in the past that it is not authorized to interfere where franchise rates have been fixed and the application will probably be overruled for this reason.

**Tacoma Jitneys Resume.**—Jitney service inside the city limits of Tacoma, Wash., which was stopped about one year ago when a heavy State bond was placed on the owners of service cars, has been resumed. The cars are operating under the old city ordinance, which gives them the right to occupy the city streets with their "For Hire" vehicles. The cars will not be operated as "donation" cars, but will establish the old fare.

**School Ticket Case Decided.**—The application of the Board of Education of Middlesex Borough for a rehearing on

its contest with the Public Service Railway, Newark, N. J., over the failure to accept school tickets on additional cars was acted upon adversely on March 13 by the Board of Public Utility Commissioners. The school board maintained that the railway was not meeting practical operating conditions for children traveling from Bound Brook to Plainfield when they could not reach school in time on the cars that honored the tickets.

**Skip Stop in Jersey Up to Companies.**—State Fuel Administrator Jenkinson, of New Jersey, acting upon the orders from P. B. Noyes, director of conservation of the United States Fuel Administration, has applied to the State Board of Public Utilities Commissioners for permission to put the skip-stop system into force on the electric railways operating throughout the State. The board announced that the laws of 1915 authorize the railways to act on their own initiative, but subject to ratification by the municipal authorities.

**Automobile Rights Assumed in Purchase.**—The Railroad Commission of California has consented to the transfer by the San Diego & South Eastern Railway, San Diego, Cal., of the right to conduct an automobile passenger and freight service between Lakeside, Ramona and Julian, San Diego County. The commission some time ago authorized the South Eastern company to operate on this route, but that company has now sold its properties to the Arizona company. The officials of the county of San Diego have approved the assignment of the franchise.

**Interurban Seeks Fare Increase.**—The Louisville & Southern Indiana Traction Company, New Albany, Ind., which operates between New Albany and Louisville by way of Jeffersonville, has filed with the Public Service Commission of Indiana a petition to double the fares on the line. By the proposed new schedule the fare from New Albany to Jeffersonville, which has been 5 cents, is increased to 10 cents, and the fare between Jeffersonville and Louisville, which now is 5 cents, is increased to 10 cents. This would increase the fare from New Albany to Louisville by way of Jeffersonville from 10 to 20 cents.

**Six Cents Not Enough.**—The Middlesex & Boston Street Railway, Boston, Mass., has filed with the Public Service Commission a new rate schedule, which if adopted will abolish the 6-cent fares on that road. At present the company has 6-cent, 7-cent and 8-cent fare zones, the first being largely operative in Waltham, Wellesley and Needham. According to the schedule filed on March 18, only the 7 and 8-cent fares would be operative, with charges of 1 cent on each transfer from a 7-cent to an 8-cent line, but there would be no charge on transfers from the 8 to the 7-cent zones. It is also proposed to abolish the present strip tickets of twenty rides for \$1.20.



# Personal Mention

## Mr. Perkins Elected

President of Shore Line Electric Railway Made President of New England Street Railway Club

Robert W. Perkins, president of the Shore Line Electric Railway, Norwich, Conn., was elected president of the New England Street Railway Club at the meeting on March 28. Mr. Perkins was born at Norwich on Aug. 21, 1865. His preparation for the transportation industry was a general business training, including clerkship with Tiffany & Company in New York City, traveling salesman, manufacturer and banker.

In 1906, when the Norwich & Westerly Railway was projected, he became



R. W. PERKINS

its treasurer, but a severe attack of typhoid, lasting several months, resulted in his severing his connection with that company in December of the same year. In 1909 the Norwich & Westerly Railway became financially embarrassed, and when the company was reorganized in 1912 as the Norwich & Westerly Traction Company, Mr. Perkins, on invitation of the bondholders' reorganization committee, became the treasurer of the new company. During the year 1912 he brought about the purchase of the Pawcatuck Valley Street Railway and the control of the Groton & Stonington Street Railway, through ownership of its common stock, these three properties thereafter being operated as one.

In 1913 Mr. Perkins was elected president of the Shore Line Electric Railway, which then consisted of a line from New Haven to Deep River, on the Connecticut River. In August, 1913, the Shore Line extended its tracks to Chester and became the lessee of the New London & East Lyme Street Railway and of the New London division of the Connecticut Company. By building about 10 miles of track a through line

was completed from New Haven to New London, supplying the last link in a line along the shore from New York to Boston.

In 1916, appreciating the advantage that would result from consolidation, Mr. Perkins and those with whom he was associated brought about the purchase by the Shore Line of the property and franchises of the Ashaway & Westerly Railway, the Norwich & Westerly Traction Company, the Groton & Stonington Street Railway and the New London & East Lyme Street Railway, which with the local New London and Norwich properties gives it about 240 miles of trackage in eastern Connecticut and western Rhode Island.

Mr. Perkins is perhaps best known in the electric railway world in connection with the introduction in New England of the flexible zone system of collecting passenger fares, first used on the Shore line and its allied properties in 1915. He has also been very active in electric freight and express development, especially in connection with the shipment of agricultural products and supplies. The use of the zone system on the Shore Line has been described in the *ELECTRIC RAILWAY JOURNAL* and the results obtained was the subject of an article by Mr. Perkins which appeared in the issue of this paper for Jan. 12, 1918, page 86.

A. C. Colby, formerly master mechanic of the Berkshire Street Railway, Pittsfield, Mass., has been transferred to a similar position with the Connecticut Company at Bridgeport, Conn.

F. L. Rearden, auditor of the Alton, Granite & St. Louis Traction Company, East St. Louis, Ill., and the East St. Louis Railway, has entered military service and is now major of the 124th Field Artillery.

Capt. H. B. Hearn, former superintendent of the Vicksburg, Shreveport & Pacific Railway, with headquarters at Shreveport, La., has been elected president of the Shreveport Traction Company, vice W. F. Dillon, who died recently as the result of an accident.

George Dolezal has been appointed acting master mechanic at the Broadway shops of the Denver (Col.) Tramway to fill the vacancy caused by the resignation of W. H. McAloney. Mr. Dolezal entered the service of the company in 1891 as a machinist. After a short period he was promoted to foreman at the East division, a position which he held until 1894, when he returned as assistant foreman to Mr. Crosby in the motor and truck department at the shops, holding this position until the death of Mr. Crosby,

when he was promoted to the foremanship. The title of the position to which Mr. Dolezal has been appointed has been changed from that of superintendent of rolling stock to the broader one of master mechanic.

## President King Resigns

Head of Washington Railway & Electric Company Retires to Attend to His Personal Interests

Clarence P. King on March 31 retired as president of the Washington Railway & Electric Company System, including the Potomac Electric Power Company, Washington, D. C., and will make his headquarters in New York City for the present in order to give attention to personal interests. Until Mr. King's successor is named the affairs of the properties at Washington will be directed by William F. Ham, vice-president and comptroller of the company.



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C. P. KING

In tendering his resignation to the board of directors Mr. King stated that other interests have been demanding his entire attention for some time, but that he delayed severing his relations until many matters vital to the welfare of the company and its employees had been adjusted. The last of these was the raising of the pay of trainmen, which was effected just prior to his retirement from office, when the board of directors voted a flat increase of 3 cents an hour for motormen and conductors.

Mr. King has directed the affairs of the Washington Railway & Electric Company for about six and a half years. The gross earnings of the corporation for 1910 were \$4,123,559. Mr. King became its president in the latter part of 1911, and by 1916 the gross earnings had jumped to \$5,539,465. Last year the gross earnings were \$5,492,358, the slight falling-off being due to the railway strike that occurred in that period. This strike was fought on the question of recognition of the union, and at the present time there are no union men in the employ of the company.



W. A. Carson, vice-president and general manager of the Evansville (Ind.) Railways, the Owensboro (Ky.) City Railroad and the Henderson (Ky.) Traction Company, with a number of associates, some of them interested with him in the Evansville Railways, has purchased the Schroeder Headlight Company, Evansville, manufacturers of locomotive oil and electric headlights and turbo-generators. A new company, known as the Schroeder Headlight & Generator Company, has been organized with Mr. Carson as active vice-president and general manager. Mr. Carson will retain his connection as vice-president and general manager of the Evansville Railways in an advisory capacity, but the operating details will be looked after by G. R. Millican. He will also continue as president of the Crescent Navigation Company. Mr. Carson has been connected with the Evansville Railways since July, 1908. He was assistant to the general superintendent of the Indianapolis & Cincin-



W. A. CARSON

nati Traction Company from 1903 to 1906 and was assistant general manager of the Indianapolis, Columbus & Southern Traction Company from 1906 to 1908. Since Mr. Carson's connection with the Evansville Railways the company constructed a line in 1908 from Evansville to Newburg and built an extension from Rockport to Grandview in 1910. That same year a syndicate composed of officials of the Evansville Railways, of which Mr. Carson was a member, purchased the city lines in Henderson and Owensboro, Ky., and Mr. Carson was appointed general manager of both companies, which were taken over by the Evansville Railways in 1913. In 1912 a lease was secured on the line of the Illinois Central Railroad between Evansville and Henderson. This property was electrified by the Evansville Railways and a gasoline car ferry was installed to transport the interurban cars across the river. In 1913 the Crescent Navigation Company was incorporated with Mr. Carson as president, to operate on the Ohio River in connection with the railway properties.

Col. Thomas F. Sullivan, roadmaster of the Boston (Mass.) Elevated Railway, in charge of engineering construction and maintenance, has been named to the Civil Service Commission by Mayor Peters of Boston for the position of Commissioner of Public Works. Colonel Sullivan was born in South Boston in 1878. He is a graduate of the Lincoln Grammar and the English High Schools. He worked up through the road department of the Boston Elevated Railway to the position of roadmaster of surface lines. He was responsible for the introduction and use of many modern road-building and road-repairing appliances. He has never held political office. He enlisted in Company I, Ninth Massachusetts Regiment at the outbreak of the Spanish War and served until the regiment was mustered out. Colonel Sullivan is a member of the American Electric Railway Engineering Association, the National Geographic Society and the Massachusetts Public Safety Committee.

E. C. Deal has been appointed general manager of the Springfield Gas & Electric Company and the Springfield Traction Company, Springfield, Mo., which are controlled by the Federal Light & Traction Company. Mr. Deal gained his early experience with the lighting company of Atlanta, Ga., which he served in various capacities from 1894 to 1898. He then entered the organization of Stone & Webster, Boston, where he filled positions on properties controlled by them in Baltimore, Md.; Seattle, Wash.; Brockton, Mass.; Terre Haute and Brazil, Ind. In 1904 he resigned from Stone & Webster to go with the Gas & Electric Company of Bergen County in New Jersey as chief engineer. When that company was absorbed by the Public Service Corporation of New Jersey, Mr. Deal became superintendent of the latter company's electric properties in central New Jersey. He severed his connection with the Public Service Corporation in 1908 to go with the firm of W. N. Coler Company, New York, as manager and engineer of public service properties owned by them. Following the acquisition of the property of the Augusta Railway & Electric Company and the Augusta-Aiken & Electric Company, by a syndicate in which J. G. White & Company, Inc., New York, were interested, Mr. Deal resigned from Coler & Company to become general manager of the Augusta-Aiken Railway & Electric Corporation, the successor company in Augusta. This was in April, 1911. In April, 1913, he was elected vice-president of the company in addition to general manager. He was also made vice-president and general manager of the Georgia-Carolina Power Company, controlled by the same interests. Mr. Deal resigned from these companies on March 1, 1914, to become connected again with the W. N. Coler & Company as vice-president and general manager

of the public utility properties owned and operated by them. He resigned from this company in May, 1917, to join the organization of the Federal Light & Traction Company as general manager of the Trinidad Electric Transmission Railway & Gas Company operating utilities in Trinidad, Col., and other cities in the State.

H. M. Byllesby, president of H. M. Byllesby & Company, Chicago, Ill., who has devoted his time to government service since November, 1917, as a major in the aviation section of the Signal Corps, in charge of national recruiting, has been commissioned lieutenant colonel in this service.

G. R. Millican has been appointed general superintendent of the Evansville (Ind.) Railways, the Owensboro (Ky.) City Railroad, and the Henderson (Ky.) Traction Company. After leaving Purdue University in 1906 Mr. Millican became associated with the Tennis Construction Company, which was then building the electric railway



G. R. MILLICAN

between Newburg, Ind., and Rockport, Ind., and was with that company until the line was put in operation by the Evansville & Eastern Electric Railway in June, 1907. In the fall of 1907 Mr. Millican became connected with the office of the Evansville & Eastern Railway, now included in the system of the Evansville Railways, and in 1908 was made chief clerk to W. A. Carson, vice-president and general manager of the Evansville Railways, in which capacity he worked until August, 1910, when he was promoted to superintendent of the Owensboro City Railroad. He remained at Owensboro until Jan. 15, 1918, when he was made general superintendent of the Evansville Railways, the Henderson Traction Company and the Owensboro City Railroad. Mr. Millican will also be general superintendent of the Crescent Navigation Company, which operates a line of boats on the Ohio River from Rockport, Ind., to Owensboro, Ky., making connection with the cars of the Evansville Railway and another boat line operating from Grandview, Ind., to Tell City, Troy and Cannelton, Ind., connecting with cars of the Evansville Railways.

# Construction News

Construction News Notes are classified under each heading alphabetically by States. An asterisk (\*) indicates a project not previously reported.

## Franchises

**Pasadena, Cal.**—The City Commissioners of Pasadena have asked permission of the Federal Reserve Board to vote on an issue of bonds intended to provide money for the purchase of the proposed municipal railway right-of-way between Pasadena and Los Angeles.

**Trenton, N. J.**—The New Jersey & Pennsylvania Traction Company has asked the City Commission of Trenton for permission to construct an additional track on Calhoun Street from West Hanover Street to the Delaware River bridge. The commission will agree to the proposition if the company will build a new bridge over Sanhican Creek at the approach to the river bridge.

**Waco, Tex.**—The Texas Electric Railway has received a franchise from the City Commission for the construction of a number of switches, spur tracks and extensions of its lines in Waco.

## Track and Roadway

**Selma (Ala.) Traction Company.**—The property of the Selma Street & Suburban Railway, recently sold at foreclosure sale to S. G. Adams, has been transferred to the Selma Traction Company, a new organization, which will now operate the property. Improvements will be made and an extension built. J. D. Woodward, Warren, Pa., president.

**Tri-City Railway, Rock Island, Ill.**—Work will soon be begun by the Tri-City Railway on the double-tracking of its line from Moline to East Moline. Material for the construction is on hand.

**United Railways, St. Louis, Mo.**—It is reported that the United Railways will construct an extension of its Hamilton Avenue line from Wydown Boulevard to Clayton Road.

**New York Municipal Railway, Brooklyn, N. Y.**—The Public Service Commission for the Second District of New York is advertising for bids to be opened on April 15 for a part of the construction of Section No. 3 of the Culver Rapid Transit Line, extending from a connection with a part of the line now under construction at Avenue X and Gravesend Avenue and extending over streets and private property

to a connection with the Coney Island Terminal of the Brooklyn Rapid Transit Company below Sheepshead Bay Road. The commission also plans in the near future to let a contract for the construction of the necessary column foundations and supports for this elevated structure. There will be one station on Section No. 3 at Neptune Avenue, and known as the Van Sicklen Station. The commission once before attempted to let a contract for the construction of this line, but found it inadvisable owing to the high price of steel and other materials prevailing. The commission's experts have been watching the steel market, however, and have learned that it may be possible to obtain an advantageous price on the necessary steel within a short time.

**Lake Shore Electric Railway, Cleveland, Ohio.**—It is reported that as soon as the new franchises are passed by the City Council of Lorain, the Lake Shore Electric Railway and the Lorain Street Railway, a subsidiary, will spend about \$500,000 in improving its property in Lorain, including the elimination of grade crossings by running out Broadway and through the Twenty-eighth Street subway, the elimination of the loop at the foot of Broadway, widening Twenty-eighth Street from Fulton Road to Pearl Street, installation of a Y in their private property on the north end of Broadway, construction of the line from Erie Avenue out Colorado Avenue to the Cromwell Steel Company, and the extension of service east and west of Erie Avenue.

**Pennsylvania Railroad, Philadelphia, Pa.**—The first electric train on the Chestnut Hill branch of the Pennsylvania Railroad was operated on March 22 to test the system. Regular operation is planned for May 1. The next portion of the system to be electrified, it is said, will be the Wilmington division.

**Philadelphia & West Chester Traction Company, Upper Darby, Pa.**—The Borough Council of West Chester has granted permission to the Philadelphia & West Chester Traction Company to extend its freight facilities and service in West Chester. An additional track will be laid by the company.

**Seattle (Wash.) Municipal Railway.**—A bill is being prepared by Oliver T. Erickson, a member of the City Council of Seattle, for submission to the Council authorizing the issuance of utility bonds and the adoption of a plan and system for the extension of the present municipal railway on Avalon Way, Thirty-fifth Avenue Southwest and Admiral Way and other streets in West Seattle. In connection

with this, a bill will be prepared providing for the issuance of utility bonds for an extension of the proposed elevated railway on Washington Street from First Avenue South to Fourth Avenue South and condemnation proceedings for the right to proceed with such construction. The bonds voted at the recent city election provide for an elevated railway beginning at First Avenue South and extending to the bridge across the West Waterway on Washington Street, Railroad Avenue, Whatcom Avenue and Spokane Street. An extension on East Marginal Way from Spokane Street to the south city limits will probably be included in one of the bills that will be introduced in the Council. It is not expected that the extension work outlined will cost more than \$100,000. Materials for the extension are on hand, and cars can be operated over the line within forty-five days after the franchise is granted.

**Charlestown (W. Va.) Interurban Railway.**—Plans are being made by the Charleston Interurban Railway for the construction of a 2-mile extension of its line. About \$500,000 will be expended for this and other improvements.

## Shops and Buildings

**Lake Shore Electric Railway, Cleveland, Ohio.**—The construction of a new passenger station at Lorain is being considered by the Lake Shore Electric Railway and the Lorain Street Railway, a subsidiary.

**Philadelphia & West Chester Traction Company, Upper Darby, Pa.**—A large freight building will be erected by the Philadelphia & West Chester Traction Company in West Chester.

## Power Houses and Substations

**Georgia Railway & Power Company, Atlanta, Ga.**—A new substation has recently been completed and placed in operation by the Georgia Railway & Power Company at Camp Gordon.

**Springfield (Mass.) Street Railway.**—The Margaret Street power station of the Springfield Street Railway has been transformed into a substation of the Turners Falls Power Company, the old steam generating plant being abolished. The company will receive power from the Turners Falls Power Company. The change is expected to mean a great improvement through making possible a greater extension of peak loads and the elimination of the use of 100 tons of coal a day.

**Charleston-Dunbar Traction Company, Charleston, W. Va.**—A report from this company states that it will place contracts within the next week for the construction of a fireproof power station and for two new boilers.

# Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

## Railway Appliance Exhibit

Number of New Track Appliances on Display at the National Railway Appliance Association Show

Track materials, tools, railway signals and the like made a good display in the exhibition held at the Coliseum, Chicago, by the National Railway Appliances Association in connection with the railway engineering convention, March 18 to 21. One noticeable feature was the absence of large machinery. With the present demand for machines of all kinds they cannot well be spared to stand idle for exhibition purposes, and there would be difficulty and cost of transportation. Nor was there the usual large area of floor space devoted to rails and switches.

In track appliances, besides the usual varied lines of rail joints, rerailers, rail anchors, tie-plates, etc., there were two designs of crossing frogs giving continuous rails for one or the other track, and a new frogless turnout in which a shifting rail takes the place of a frog. A gas-heating system to prevent the collection of snow and ice at switches was one of the specialties. Substitutes for wood ties were represented by a built-up steel substructure, as used mainly for track crossings and street-railway track, and a metal tie composed of two steel castings connected by a tie bar. Something new in track fastenings was a spike made of a piece of round iron with one end bent into a loop to form the head. The spikes are driven under the rail at an angle of about 45 deg., with the end of the loop resting on the rail base.

## Steady Demand for Coal-Crushing Apparatus

Manufacturers Meet a Necessity Occasioned by the Acute Fuel Situation

Manufacturers report that coal-crushing apparatus is enjoying a steady demand of considerable volume. There are several reasons for this. First, attention has been called to the very serious waste of fuel unless it is properly sized to burn on ordinary stokers. Second, the acute coal situation has made it necessary for coal buyers to take any kind of coal they could get, whereas in the past they might demand some particular grade or size of coal. This makes it necessary to install crushing apparatus at the plant of the consumer. Third, the manufacturers of crushing apparatus have ceased to devote their energies to trying to convert the coal mines themselves to the necessity of

crushing coal and have turned their energies toward the more fertile field of the coal user. All these factors have contributed to build up a healthy demand in the industry for coal-crushing apparatus.

## Fussiness in Car Designs Not Tolerated By Builders

Specifications Must be Standard—Prompt Deliveries Mean Considerably Higher Cost

Railway men who are either in the market or are contemplating placing orders for new rolling stock are finding out a few things about the attitude of car builders during these strenuous days. The traffic operating manager of an important system, who inquired for specifications recently said he was rather surprised at the firmness with which the construction companies expressed themselves on so-called fussy designs. He found that anything outside of standard requirements would not be accepted excepting on long delivery. This meant, according to his statement, that the deliveries are postponed so long that by the time designated for shipment arrived the rolling stock was not needed. The traction official was frankly informed that fussiness in trim, furnishing and finishing of any cars these days would not be considered, unless on an indefinite future delivery. The cost would also be higher.

Another instance where delivery and cost figures related to the purchase of a milling machine for a traction road's car shop. One had been installed and operated with entire satisfaction for quite a period. A second was needed and the manager visited the manufacturer. At the close the railway man remarked that he supposed the price would be greater than the machine bought before. The maker declared no change had been made in prices. When it was mentioned that the milling machine was needed for immediate delivery the prospective buyer was blandly informed that under those circumstances the cost would be 75 per cent higher, otherwise it could not be shipped in three years. The railway official said he expected to pay an advance figure for the machine in question, but this was going it pretty strong. However, he declared this appeared to be the prevailing conditions everywhere and on everything. Urgency of deliveries was the controlling factor in determining price, the cost being a secondary consideration.

## Buying at Low Ebb

Serious Condition of Delivery Situation on a Number of Electric Railway Staples Listed

Information secured from operating companies, manufacturer's representatives and jobbers indicates that the purchase of electric railway equipment and corresponding supply materials has certainly reached a low ebb in the Southeast. Compared with the same months of last year, the volume of sales shows a decided decrease. While it is true that a quantity of equipment has been bought by companies operating where military establishments have been located, requirements are pretty well provided for, and, on the whole, the present outlook is very quiet, with the possible exception of the activity now taking place at coastal cities or shipbuilding centers. Even at these points a degree of uncertainty exists, owing to the fact that nothing definite is known as to how far governmental assistance will extend. These operating companies are trying to handle the situation as they may arise, with existing equipment, together with certain additions readily available.

There is no doubt but that equipment from generating units and cars to rail bonds is badly needed, but the question is how to raise the funds, and if these are attainable, deliveries are the next potent factor. For those companies which have purchased fill-in and maintenance supplies to cover much-needed repairs and up-keep, the per-verse transportation conditions, together with the fact that other essential industries are now calling on manufacturers for material of a similar nature, has further added to the difficulties at present experienced by operating officials.

Hydraulic jacks are promised in three to four months, geared ratchet and high-speed have been boosted to four to five months. The deliveries on gears and pinions show little change, holding at two to three months. One redeeming feature may be mentioned, and that is that lightning arresters can usually be obtained from stock. Trolley wire and feeder cable may be obtained anywhere from twenty to seventy days, depending on the factory conditions at the time of purchase. A very slight improvement is noticed in hangers and ears.

Rail bonds are reported to be coming along very well—thirty days being the average. The promise of shipment and deliveries on spikes is getting worse. It is almost impossible to get any date

on rails and only in isolated instances can they be secured in a reasonable time, and then in small quantities. Ties are coming along fairly well in small lots, with extended delivery dates on large orders. The delivery of brake equipment is somewhat uncertain, running from thirty days on priority orders for quassi-government work, to

three and four months on less essential orders.

Motor shipments are averaging from four to eight months. Controllers may be secured in five months, and car cable in a shorter time. On the whole, the above deliveries can be bettered if the equipment is to be used in serving military bases.

## Supply of Raw Material Now in Fair Condition

### Current Needs Difficult to Satisfy—Anticipating Requirements the Only Solution—Shipments and Deliveries Vexing

Broadly speaking, manufacturers appear to be in a fairly satisfactory position respecting the supply of raw material. Interviews with leading concerns in the various branches of the trade confirm this impression. Moreover, there is no indication of uneasiness regarding future requirements, despite the governmental restrictions on certain metals and other basic material. Deliveries, of course, are the bane of the industry, so much so that they are mentioned as affecting the ultimate selling price of the finished product. On the matter of prices generally an authority said that the most important factor contributing to the increases are the intensification of demand for material, the disruption of distributing processes, a shortage of labor and the decrease in the production of various products. Manufacturers with expanding programs are obliged to buy material when the opportunity presents itself for the certain delivery of the goods, preparing against periods when cars are unavailable for shipments. In other words, manufacturers have to stock requirements for future operations on a far greater scale than they would if they could depend on deliveries when the supplies are needed.

As one producer stated, the demand for raw material in the steel, iron and copper lines appears to have no limit. To be sure, it was explained, the situation is badly mixed, but the supply of metal and other material entering into the manufacture of machinery, generators, motors, transformers and apparatus of every description is easing up and deliveries are slightly better. Concerning wire and cables it was learned that copper seems to be plentiful for other than government work and can easily be had if the producers have it, and they are not yet being reported as short of the metal. Prices remain at the official standards. Shipments from the smelters can be made, but the embargoes hold up the deliveries. Unless priority orders, to which all shipments of this kind are subject, are obtained from the freight traffic committee by the consignee, the delay may be indefinite. Cotton and rubber, indispensable in the production of certain wire, cable and other electrical products, are practically in the same class as copper.

In other lines where not only copper is an essential but brass, slate, steel castings and sheets are basic materials

a representative of one of the largest manufacturers in either East or West said that his company had anticipated its requirements for the last two years and was therefore fully provided to meet every demand. In the fall of 1915 this concern carefully went over its inventories for the preceding year, and it based its requirements for 1916 on the aggregate plus 100 per cent. It was figured that this would represent the probable increase in the business, and material was placed on order on this basis. Of this stock of raw material 92 per cent was worked up into its finished products, representing only 8 per cent of overbuying. For 1917 the same plan was adopted, with a still further increase of 30 to 35 per cent, which will carry the plant up to September of this year.

By placing its orders far in advance this manufacturer—and there appear to be others following the same plan—provided against future inconvenience or shortage of material. The first question to be considered is the one of delivery, with price secondary, a rule which seems to prevail in every transaction. According to this concern, no contracts on copper can be made for future requirements. It is bought at the market—base price plus the cost of rolling or drawing. In order to be sure of a shipment of copper a manu-

facturer had three cars of the metal forwarded by express from Connecticut to a Western city at a cost of \$6,000. The company in question, like three-fourths or more of the manufacturers, has government contracts, and therefore shipments of either raw material or the finished goods are granted the advantages of priority certificates, otherwise the embargoes interfere with deliveries to the regular trade.

An advance in steel castings is considered a probability by a number of manufacturers, although it is intimated that the official price, which remains in force until March 31, will remain at the present figure. The American Iron and Steel Institute, acting in conjunction with the War Industries Board on this question, declines to state its position one way or the other. As regards gears and pinions, a manufacturer of prominence said, shipments have been held up since Jan. 1, which has resulted in the delivery of only a quarter of the quantity usually sent out. All export business has been suspended for the time being. While government control is not affecting gear steel, forged gear blanks are almost impossible to obtain on reasonable delivery. Pinion material is costing more than ever before, but prices have not advanced recently. Malleable iron is easier. In plants of this description and those on parallel lines in the electrical field labor is the most trying problem. Skilled workmen are required, and they are scarce and of uncertain tenure on account of the abnormal wages.

Quotations on nearly if not quite all raw material for electrical goods are made f.o.b. plant, with shipment at convenience of mill or factory. As one of several manufacturers who volunteered the information said, shipments in the immediate neighborhood can be accomplished, but to reach points in the Middle West with either material or finished goods is difficult, often taking two or three months.

### Rolling Stock

Aurora, Elgin & Chicago Railroad, Aurora, Ill., advises the *ELECTRIC RAILWAY JOURNAL* that the purchase of six new cars reported in this column on March 16 is unfounded.

Springfield (Mo.) Traction Company has on delivery twelve new one-man cars built by the American Car Company, St. Louis, Mo. The cars were ordered in July last and were en route last week.

Central Arkansas Railway & Light Corporation, Hot Springs, Ark., has just received seven new one-man cars from the American Car Company. It has also bought five second-hand cars, which were rebuilt in its shops and are now in operation, replacing the rolling stock destroyed by fire in December last.

Chattahoochee Valley Railway, West Point, Ga., has put in commission on its system another new car, the second of the two reported as having been purchased.

New Jersey Transportation Company, a subsidiary of the Public Service Corporation of New Jersey, Newark, N. J., in order to temporarily furnish transportation facilities in advance of track construction, to new shipyards at Port Newark Terminal from the end of one of its lines, is reported to have purchased eighteen second-hand motor-buses.

Charleston Consolidated Railway & Light Company, Charleston, S. C., is reported as having placed an order for seven new passenger cars with the Cincinnati Car Company. Four are double-truck, center-entrance cars, automatic control and of the pay-as-you-enter type, seating fifty-two passengers. The remaining three will be light rolling stock, seating thirty-two, with automatic controls and also of the



pay-as-you-enter model. Delivery is promised in five months.

**Murphysboro & Southern Illinois Railway, Murphysboro, Ill.**, mentioned in the *ELECTRIC RAILWAY JOURNAL* as having ordered new rolling stock, furnishes the following specifications:

Number of cars ordered ..... 2  
Name of road, Murphysboro & Southern Ill. Ry.  
Builder of car body, American Car Co.  
Type of Car, Closed Motor Passenger  
Seating capacity, 50  
Bolster centers, length, 23 ft. 0 in.  
Length over bumpers, 46 ft. 0 in.  
Length over vestibule, 45 ft. 0 in.  
Width over all, 8 ft. 10 in.  
Height, rail to trolley base, 12 ft. 7 in.  
Body, Semi-steel  
Interior trim, Polish bronze  
Headlining, Agasote  
Roof, Arch  
Air brakes

Westinghouse Traction Brake Co.  
Axles, J. G. Brill Co.  
Bumpers, American Car Co.  
Car trimmings, J. G. Brill Co.  
Control, type, H. L.  
Couplers, Tomlinson M. C. B. (Radial)  
Curtain fixtures, Curtain Supply Co.  
Curtain material, Curtain Supply Co.  
Fenders or wheelguards, Wood pilots  
Gears and pinions, Westinghouse vertical staff with Pittsburg drop handle  
Hand brakes, Giant perfected brake drum  
Heaters, Peter Smith hot water  
Headlights, Golden Glow S-M-95-9  
Journal boxes, J. G. Brill Co.  
Lightning arresters, Westinghouse  
Motors, Westinghouse No. 523-B 4 per car  
Motors, Inside hung  
Sanders

Keystone air, E. S. S. Co.'s No. 18,575  
Sash fixtures, Dayton Mfg. Co.  
Seats, style, Brill Winner cressed steel reversible  
Seating material, Rattan  
Springs, J. G. Brill Co.  
Step treads, Feralun safety treads  
Trolley retrievers, Knutson No. 2  
Trolley base, Westinghouse  
Trolley wheels or shoes, Westinghouse  
Trucks type, Brill 27-M C. B. 2x  
Ventilators, Brill exhaust  
Wheels (type and size), 33 in. Davis cast steel M. C. B.

**Toronto (Canada) Railway** is reported as making specifications and queries on 100 new passenger cars. The company lost 130 cars by fire about a year ago, referred to previously in the *ELECTRIC RAILWAY JOURNAL*.

**Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.**, is reported as contemplating the purchase of seventy-five new one-man cars, additional to the lot on which quotations were asked from car builders, reference to which was made in the *ELECTRIC RAILWAY JOURNAL* of March 23.

**Cleveland (Ohio) Railway** having ordered twenty-five cars, as reported

in the *ELECTRIC RAILWAY JOURNAL* of March 16, the G. C. Kuhlman Car Co., builders, furnishes the specifications below:

Number of cars ordered ..... 25  
Name of road, Cleveland Ry.  
Date order was placed, Jan. 16, 1917  
Date of delivery, Already delivered  
Builder of car body, G. C. Kuhlman Car Co.  
Type of car, Center-entrance trailer  
Seating capacity, 59 in winter and 69 in summer  
Bolster centers, length, 26 ft. 0 in.  
Length over bumpers, 19 ft. 0 in.  
Length over vestibule, 48 ft. 0 in.  
Width over all, 8 ft. 4 1/2 in.  
Height, rail to trolley base, 11 ft. 3 7/16 in.  
Body, Semi-steel  
Interior trim, Cherry  
Headlining, Agasote  
Roof, Plain arch  
Air brakes, Westinghouse  
Axles, Laclede Steel Co.  
Bumpers, Channel type  
Car trimmings, Railway Company's Standard  
Couplers, Ohio Brass  
Curtain fixtures, Curtain Supply Co.  
Curtain material, Printed duck  
Designation signs, Railway Company's Standard  
Door operating mechanism, National Pneumatic

Hand brakes, Railway Company's Standard  
Heaters, Peer Smith  
Journal boxes, Symington Co.  
Paint, varnish or enamel, Sherwin-Williams, paint, Chicago outside varnish, Wright's inside varnish.  
Sash fixtures, No fixtures, drop sash  
Seats, style, Brill  
Seating material, Rattan upholstered  
Springs, Brill for seats  
Step treads, Kass  
Trucks, type, Brill 67-F Trail  
Ventilators, Scullin type  
Wheels, 26-in. steel

**Philadelphia Rapid Transit Company** has been ordered by the Public Service Commission of Pennsylvania, as a result of the inquiry into service in that city, to purchase on or before Dec. 1, 1919, 100 new cars of the larger type. Following the cessation of the war, the company is directed to purchase new cars annually.

**Portland Railway Light & Power Company, Portland, Ore.**—Public Service Commissioner Buchtel, of Oregon, upon receipt of a report from Public Utilities Engineer Fred A. Rasch that the company would not be able to remodel nineteen cars to be used in relieving the congestion on its lines in the city until in the summer, stated that he would ask the company to increase the force employed in the remodeling work, and insist that the work be expedited. All of the nineteen cars are of the open type, and it will cost \$25,000 to remodel them.

## Trade Notes

**Triangle Conduit Company, Brooklyn, N. Y.**, announces the appointment of Alva D. Stein, 156 Purchase Street, Boston, Mass., as its New England selling agent.

**Permutit Company, New York, N. Y.**, manufacturer of water-softening and rectification apparatus, has removed from 30 East Forty-second Street to 440 Fourth Avenue, where the entire top floor will be occupied by its offices.

**Captain Richard P. Henry**, late of the United States Army, has joined the selling forces of the Square D Company of Detroit, manufacturer of steel-enclosed safety switches, and has been appointed to the Indiana territory, with headquarters at Indianapolis.

**Frank J. Foley**, formerly manager of the mining department of the Westinghouse Electric & Manufacturing Company, on Jan. 1 became connected with the Edison Storage Battery Company, Orange, N. J., as manager of the mining and traction department, with headquarters at the main office.

## New Advertising Literature

**Railway & Industrial Engineering Company, Pittsburgh, Pa.**: Illustrated folder descriptive of its various Burke specialties and their installation.

**Wells-Morris Manufacturing Company, San Francisco, Cal.**: Leaflet descriptive of its Wells motor-starting switches, designed for low-voltage and overload protection.

**Pass & Seymour, Solvay, N. Y.**: Three leaflets descriptive of their P. & S. 60,020 medium-base brass-covered receptacle, P. & S. 299 pull-chain brass splicing link, P. & S. porcelain receptacles and P. & S. sign receptacles.

**Keyes Products Company, New York, N. Y.**: Illustrated catalog on "Nevasplit Panels—A Lumber Question Answered," descriptive of the company's products, how made, their various uses and the results.

## RAILWAY MATERIALS

	March 20 27-30	March 27 27-30
Rubber-covered wire base, N. Y., cents lb.		
Weatherproof wire (100 lb. lots), cents per lb., New York	28 1/2 to 34 1/2	28 1/2 to 34 1/2
Weatherproof wire (100 lb. lots), cents per lb., Chicago	33.42 to 28.35	33.42 to 38.55 1/2
Rails, heavy, Bessemer, Pittsburgh	\$55.00	\$55.00
Rails, heavy, O. H. Pittsburgh, per gross ton	\$57.00	\$57.00
Wire nails, Pittsburgh, per 100 lb.	\$3.50	\$13.50
Railroad spikes, X in., Pittsburgh, 100 lb.	\$3.90	\$3.90
Steel bars, Pittsburgh, per 100 lb.	\$5.00	\$5.00
Sheet iron, black (24 gage), Pittsburgh, per 100 lb.	\$4.90	\$4.90
Sheet iron, galvanized (24 gage), Pittsburgh, per 100 lb.	\$5.80	\$5.80
Galvanized barbed wire, Pittsburgh, cents per lb.	\$4.35	\$14.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.	\$3.95	\$3.95
Cement (earload lots), New York, per bbl.	\$2.25	\$2.65
Cement (earload lots), Chicago, per bbl.	\$2.31	\$2.71
Cement (earload lots), Seattle, per bbl.	\$2.65	\$4.1
Linseed oil (raw, 5 bbl. lots), N. Y., gal.	\$1.58	\$1.57
Linseed oil (boiled, 5 bbl. lots), N. Y., gal.	\$1.59	\$1.59
White lead (100 lb. keg), N. Y., cents lb.	10	10
Turpentine (bbl. lots), N. Y., cents gal.	44 1/2	44 1/2

\* Nominal. † Governmental price in 50-ton lots, f.o.b. plant.

## NEW YORK METAL MARKET PRICES

	March 20	March 27
Copper, ingots, cents per lb.	23 1/2	23 1/2
Copper wire base, cents per lb.	26 1/2 to 26 1/2	26 1/2 to 26 1/2
Lead, cents per lb.	7 1/2	7 1/2
Nickel, cents per lb.	50	50
Spelter, cents per lb.	7 1/2	7 1/2
Tin, Straits, cents per lb.	\$85.00	\$85.00
Aluminum, 98 to 99 per cent., cents per lb.		†32

## OLD METAL PRICES—NEW YORK

	March 20	March 27
Heavy copper, cents per lb.	22	22
Light copper, cents per lb.	19 1/2	19 1/2
Red brass, cents per lb.	18	18
Yellow brass, cents per lb.	13	13
Lead, heavy, cents per lb.	6.38	6.375
Zinc, cents per lb.	5 1/2	5 1/2
Steel car axles, Chicago, per net ton	\$42.41	\$42.41
Old car wheels, Chicago, per gross ton	\$30.00	\$30.00
Steel rails (scrap), Chicago, per gross ton	\$35.00	\$35.00
Steel rails (relaying), Chicago, per gross ton	\$60.00	\$60.00
Machine shop turnings, Chicago, per net ton	\$17.00	\$17.00



# A Great Saving in Power →

This recorder has shown in its service on more than 1200 cars that it can help to produce tremendous savings in consumption of energy.



## The Arthur Power-Saving Recorder

is now being marketed with an additional feature which insures even greater savings.



### This Added Feature

possesses the important advantage of checking the motorman's operation of

#### the controller

while retaining all the values which come from checking his operation of

#### the brakes

Requires no live wires—no fuses—no shunts—no resistances—no switches.

Do you see the enormous possibilities which this presents in educating your car crews to the best methods of safe operation and the minimum consumption of power? Write us for detailed information.

**The Arthur Power-Saving Recorder Co.**

Second National Bank Building, New Haven, Conn.

*"Power wasted is the true measure of the motormen's relative efficiency"*

# On the Road

# The Lincoln

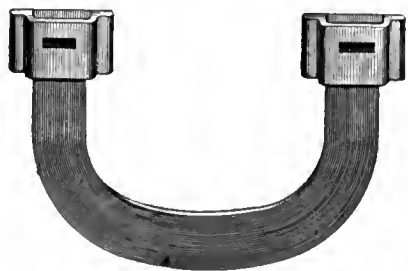
## Earns Big Profits for the

When the Denver Tramway Co. of Denver, Colo., was confronted by the necessity of installing an emergency rail repair outfit, it selected a Lincoln

Bonding outfit, mounted it on a converted Ford car and sent it on its round of duties. This outfit has proved remarkably efficient; it has been despatched on emergency calls, reaching the spot in record time and completing the repair in less time than it takes the ordinary railwelding outfit to get started.



Because of its instant response to every welding demand this Denver outfit is paying big returns on the investment, and the company characterizes its performance as "very satisfactory."



*A true Integral Weld made in the shortest time  
at minimum cost and without resistance losses*

# The Lincoln

## 636 Huron Road

### AGENTS:

BOSTON  
Charles N. Wood Co.  
NEW YORK  
Atlantic Welding Co.

PHILADELPHIA  
Railway Track-work Co.  
PITTSBURGH  
Electrical Engineering &  
Manufacturing Co.

# and in the Shop

## Bonder

### Company

Shop welding by means of a Lincoln Bonding Outfit is being recognized as a great help to more efficient maintenance. The ordinary bonding outfit is forced to stay idle during winter weather and the capital sunk in it brings no interest.

The Lincoln Bonder can be used **every day of the year** and the rate of interest,



The New Brunswick Power & Light Co., St. Johns, N. B., Canada.

or profit, which it bears is directly proportionate to the number of hours it works during the year.

## LINCOLN ECONOMY

### In Men

Labor today is the big problem on Street Railways. Two men can do your bonding rapidly and efficiently.

### In Energy

The machine can be lifted on or off the tracks by two men in less than one minute to allow the cars to pass.

### In Expense

Lincoln bonds are less expensive than other types. Can be welded to the rail in 40 to 50 seconds and will show you a saving of 25 to 35 cents on each bond.

In the ordinary brazing machine the rail is heated all the way through before the bond will stick.

With the Lincoln you can put your hand opposite the weld the instant it is finished—and not burn your fingers! No heat—or current—is wasted!

The Lincoln Bond Welder takes from 8 to 10 kilowatts from the trolley line, and gives an average of 150 amperes welding. Resistance welder takes from 75 to 85 kilowatts to do the same work.

With the resistance type of welder, the electrode in the operator's hand carries full voltage of the trolley line.

# Bonding Company

Cleveland, Ohio

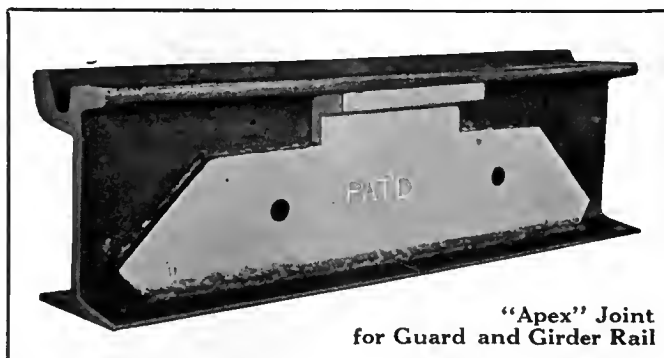
### AGENTS:

CHICAGO  
Holden & White, Inc.  
ST. LOUIS  
W. L. Rose Equip. Co.

MILWAUKEE  
W. C. Burdick  
LOS ANGELES  
Wigmore, Hall & Co.

MONTREAL—CANADA:  
Lyman Tube & Supply Co., Ltd.

# The Old Rails Must Hold Out They'll Do It With American Ingenuity



"Apex" Joint  
for Guard and Girder Rail

The wear and tear on rails this winter have been terrific and thousands of rails must be renewed this spring or summer. How it is going to be accomplished when new rails are

not to be had is worrying many a railway engineer. There is a solution — and a most satisfactory one from the viewpoint of every practical railroad man — it is the adoption of

## INDIANAPOLIS WELDED JOINTS

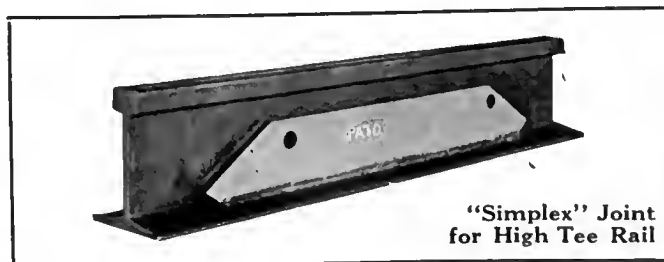
"Indianapolis" Joints are adapted to severe, continuous service under varying conditions; they reinforce the rails at the vital spots; they are made of the strongest, toughest materials and are designed and built in accordance with highest engineering skill and accepted railroad practice. Hundreds of railway companies are using them with extremely satisfactory results.



As a matter of economy, right at this time "Indianapolis" Joints are filling the great gap between worn rails and non-supply. The demand for "Indianapolis" Joints is increasing rapidly, as every railway company that ever tries them quickly extends the use of them over their entire system. You will find them a big help in doubling the life of your rails.

*Let us give you complete details.*

**Indianapolis Switch & Frog Co.**  
Springfield, Ohio



"Simplex" Joint  
for High Tee Rail

## At Home or Abroad

under all conditions of operation, in all climates, with all different kinds of labor, wherever the machine has once been thoroughly tried out, the verdict is always the same in regard to the results attained in the use of the

# Reciprocating Track Grinder "Extremely Satisfactory"

*Companhia Carris de Ferro de Lisboa*  
SOCIEDADE ANÔNIMA DE RESPONSABILIDADE LIMITADA

ENDEREÇAR TODA A CORRESPONDENCIA

À SÉDE EM

SANTO AMARO  
LISBOA

ENDEREÇO TELEGRAFICO

•TRAMWAYS, LISBON•

CODIGOS TELEGRAFICOS USADOS

A, B, C,  
BROOMHALL,  
LIEBER

Carta n.º	---	MAB
Inclusos	---	ARM.

*Lisboa,* 17th November 1917.

Railway Track-Work Company,  
30th & Walnut Sts.,  
Philadelphia  
(America do Norte)

Dear Sirs,

In reply to your letter of the 26th ult.,  
inquiring as to the results obtained from the use  
of the Reciprocating Track Grinder we purchased  
from you sometime ago, we are pleased to say that  
we are extremely well satisfied with it.

Yours faithfully,

*A.O. Koeckhovich*  
General Manager & Chief Engineer.

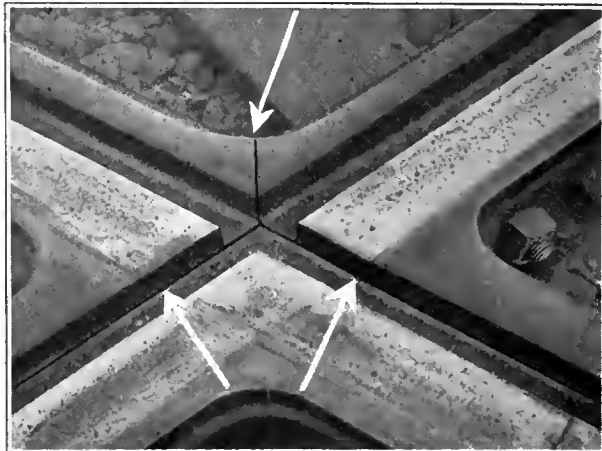
**RAILWAY TRACK-WORK COMPANY**  
30th and Walnut Streets, Philadelphia

AGENTS: Holden & White, Inc., 343 S. Dearborn St., Chicago. Wigmore, Hall & Co., Pacific Electric Bldg., Los Angeles, Cal.





What Happens to a Rolled Rail Crossing



Joints in Balkwill Articulated Cast Manganese Crossings are life savers. They positively prevent breakage at flangeway intersections, permitting 100% wear before renewal

## Why Balkwill Articulated Cast Manganese Crossings Are Superior to Rolled Rail Crossings

This picture at the left shows where breaks in the main steel filling or backbone of rolled rail crossings are usually found.

These breaks are unavoidable because of the lack of flexibility of the rolled steel filler at the flangeway intersection.

In the Balkwill Articulated Cast-Manganese Crossing the difficulty is

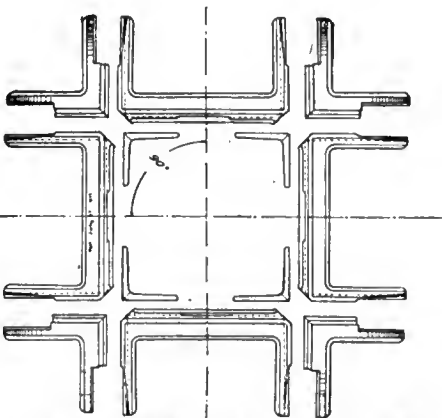
corrected by placing scientifically designed joints at the very places where breakage formerly occurred.

The lower first cost of a rolled rail crossing is therefore not a lower overall cost because it takes several rolled rail crossings to equal the life of one Balkwill Articulated Cast Manganese Crossing. Therefore the Balkwill Crossing is the cheapest in the long run. It gives

### MORE WEAR PER DOLLAR THAN ANY OTHER CROSSING YOU CAN BUY

It saves interruptions to traffic, makes less demand on labor, which is now so scarce, and also reduces the cost of making replacements frequently.

Write us for data on existing installations. If your special work manufacturer cannot get prompt deliveries of manganese castings or has not taken out a license to manufacture these crossings, **DON'T ACCEPT A SUBSTITUTE** but write us direct and we will see that your requirements are taken care of.



Joints at the flangeway intersections of Balkwill Articulated Cast Manganese Crossings positively eliminate breakage

**Order Balkwill Articulated Cast Manganese Crossings  
Direct from Your Special Work Manufacturers**

# **The Balkwill Manganese Crossing Co.**

506 Williamson Building, Cleveland, Ohio



# The Columbia Foundry



can handle almost anything in Grey Iron—Semi-Steel—  
Bronze—Composition—Etc.



Pouring 6000 Lb. of Metal in the Casting of a Base Plate.

**T**HE big scale of Columbia foundry operations couldn't be demonstrated to better advantage than in this illustration—showing the pouring of 6000 lb. of molten metal to make a cast iron base plate for a machine tool. The Columbia foundries are equipped to make anything in the line of castings—and to make it well.

*Have you all of these Columbia specialties in your service?*

## Columbia Machine Works & Malleable Iron Co.

### TOOLS

Armature and Axle Straighteners  
Armature shaft straighteners  
Armature buggies and stands  
Babbling molds  
Banding and heading machines  
Car hoists  
Car replacers  
Coil taping machines for armature leads  
Coil winding machines  
Pinion pullers  
Pit jacks  
Signal or target switches  
Tension stands

Atlantic Ave. and Chestnut St.  
Brooklyn, N. Y.

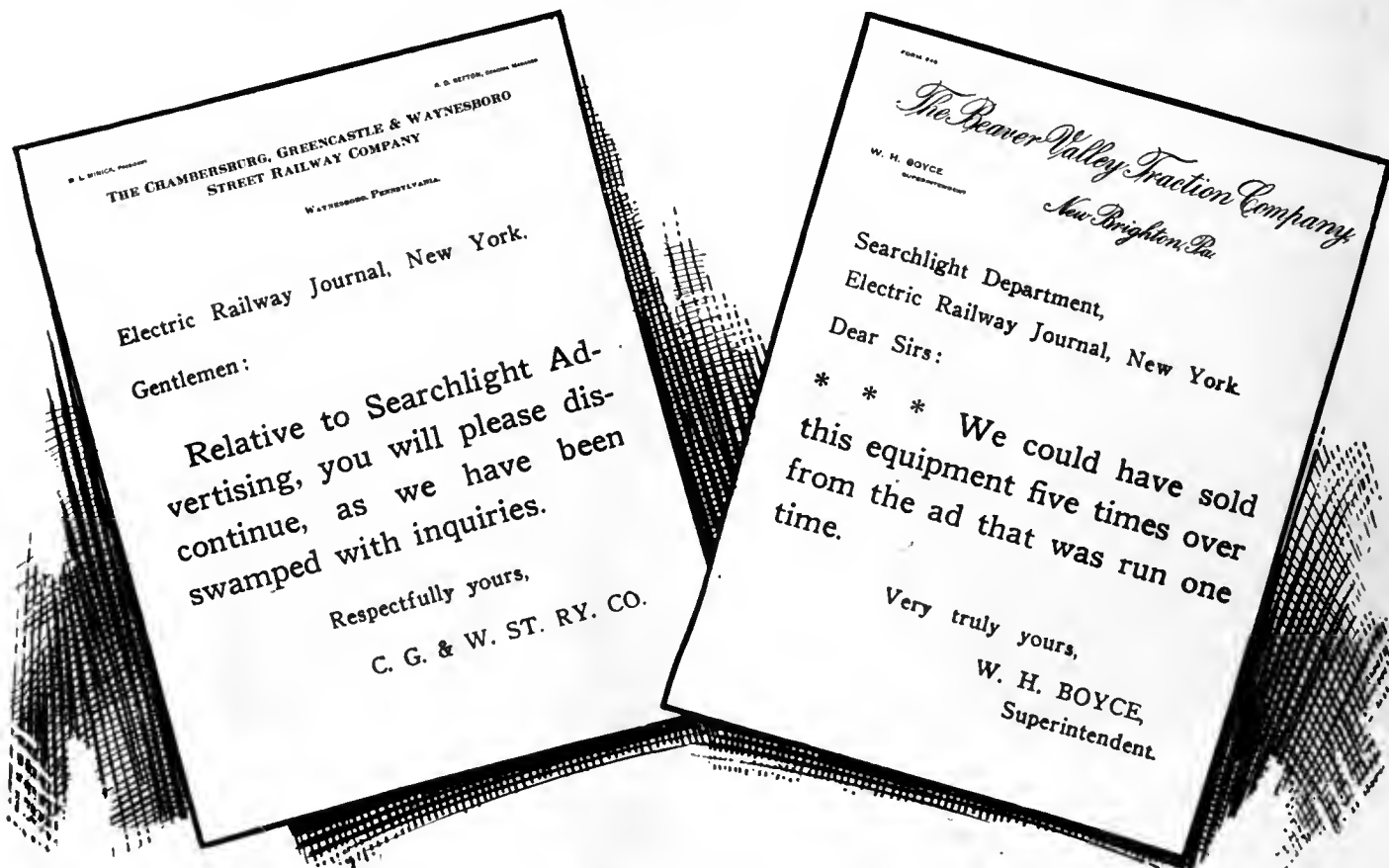
W. R. Kerschner Co., Inc., N. Y.  
Holden & White, Inc., Chicago  
F. F. Bodler, San Francisco  
Railway & Power Eng. Corp., Ltd., Toronto, Can.



### CAR EQUIPMENT

Armature and Axle Bearings  
Armature and field coils  
Bearings (Axle and Armature)  
Brush-holders and brush-holder springs  
Brake, door and other handles  
Brake forgings, riggings, etc.  
Car trimmings  
Commutators  
Controller handles  
Forgings of all kinds  
Gear cases (steel or mall. iron)  
Grid resistors  
Third-rail shoe beams and accessories  
Trolley poles (steel) and wheels

# Business is Booming!



*Are you  
getting your share?*

Second-hand equipment is commanding a premium. Look over your stock and convert it into cash. Send us the list.

**Searchlight**  
 advertising  
 will find the anxious buyer for you.

*SEND US YOUR LIST*

Electric Railway Journal, 10th Ave., at 36th St., New York

## Less Work for the Conductor— Better Collection for the Railway— That's the Johnson Fare Box and Metal Ticket Plan at Mobile



The Mobile Light & Railroad Company not only showed its appreciation of the best equipment in city fare collection by using Johnson (Four-cyclometer) Fare Boxes and Johnson Metal Tickets, but also took care to get maximum operating advantages from that equipment.

The conductor stands on the far side of the platform but facing the entrance with the Johnson Fare Box directly in front of him.

The Johnson Fare Box is located on a post between the platform and car body so that a number of passengers can board the car and stand between the doors and the fare box. This off-side arrangement facilitates the rapid boarding of cars.

The conductor operates the inside register through pedals, leaving his hands free to issue transfers, operate doors and give the starting signal.

The conductor is relieved of giving stop signals as the cars have push-buttons for the passengers.

Naturally, the foregoing measures also have a tendency to reduce even the very small ratio of platform accidents at Mobile.

Mobile's wise application of Johnson Fare Collecting Equipment shows that the conductor's work can be so simplified that the job can be handled by a woman as the

Labor of fare collection is less than that of a cashier in a restaurant.



### JOHNSON FARE BOX COMPANY

Jackson Boulevard and Robey St., Chicago

50 East 42nd Street, New York



# Noark Approved Fuses

**D**URING the war, it is imperative that every factory and power plant—the main supports of our National defense—operate without accident or delay. Yet to-morrow may see your production schedule knocked into a cocked hat. Short circuit and overload burnouts constantly threaten and only fuses stand between. If your fuses aren't as good as you can buy, you're running too great a risk.

In making "Noark" Approved Fuses, our first consideration is precision. A "Noark" Approved Fuse operates on an accurate schedule. It is due the

instant the load attempts to pass out of the safety zone and it's always on time in both directions. That is the reason "Noark" Approved Fuses have such a wonderful service record and are now used to protect equipment worth millions.

"Noark" Approved Fuses bear the inspection label and the approval of the Underwriters' Laboratories, Inc.

Made in all amperages for voltages up to 2500, "Noarks" meet all practical requirements. Send for booklet and price list.

Manufactured by the Johns-Pratt Co., Hartford, Conn.  
H. W. Johns-Manville Co., Sole Selling Agents

**H. W. JOHNS-MANVILLE CO.**  
NEW YORK CITY

10 Factories—Branches in 61 Large Cities



Since 1903 Carnegie Steel Company has been engaged in the manufacture of

## Steel Cross Ties

for steam and electric railway service, industrial track, etc.

It has given to the development of steel cross ties the skill gained by years of experience in their manufacture, and on the basis of that experience recommends steel tie construction for street railway track in paved city streets of the highest class where economy in ultimate expenditure may be secured and where the necessity for renewals and repairs should be reduced to a minimum.

The illustrations show steel cross ties installed on Euclid Avenue, Cleveland, Ohio.

**Carnegie Steel Company**  
General Offices—Pittsburgh, Pa.



# Don't Risk Men's Lives

The company which in these days of labor shortage omits precautions against accidents, is *not* acting in the best interests of the nation.

Read  
the  
Tag!



**RIMCO**  
RUBBER  
INSULATED  
PLIERS



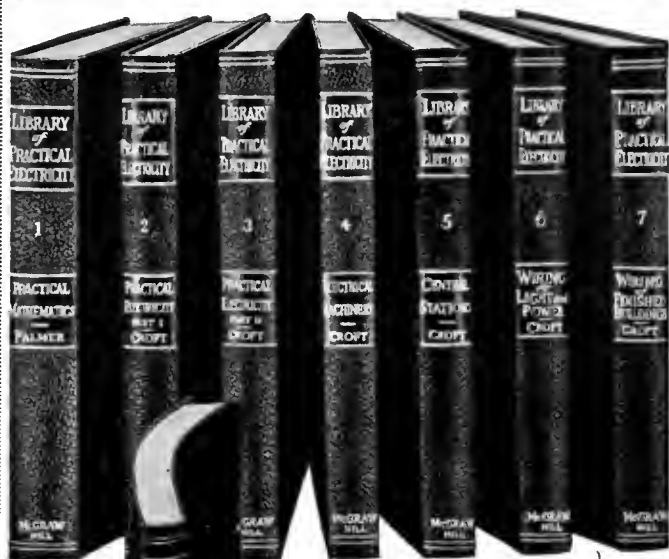
## The Rubber Insulated Metals Corporation

Sole owners of the Elchemco Process for bonding rubber to metals, protected by American and Foreign Patents.

Plainfield, N. J.

### SALES AGENTS

Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa. National Railway Appliance Co., 50 East 42nd St., New York City  
Canadian Agent: Lyman Tube & Supply Co., Ltd., Montreal, Toronto and Winnipeg.



8  
Flexible  
Volumes  
Pocket  
Size

**Yes,**  
Croft's Library  
of Practical  
Electricity will  
help to reduce  
operating expenses

These eight modern-method volumes should be on the desk of everyone having to do with electric railways.

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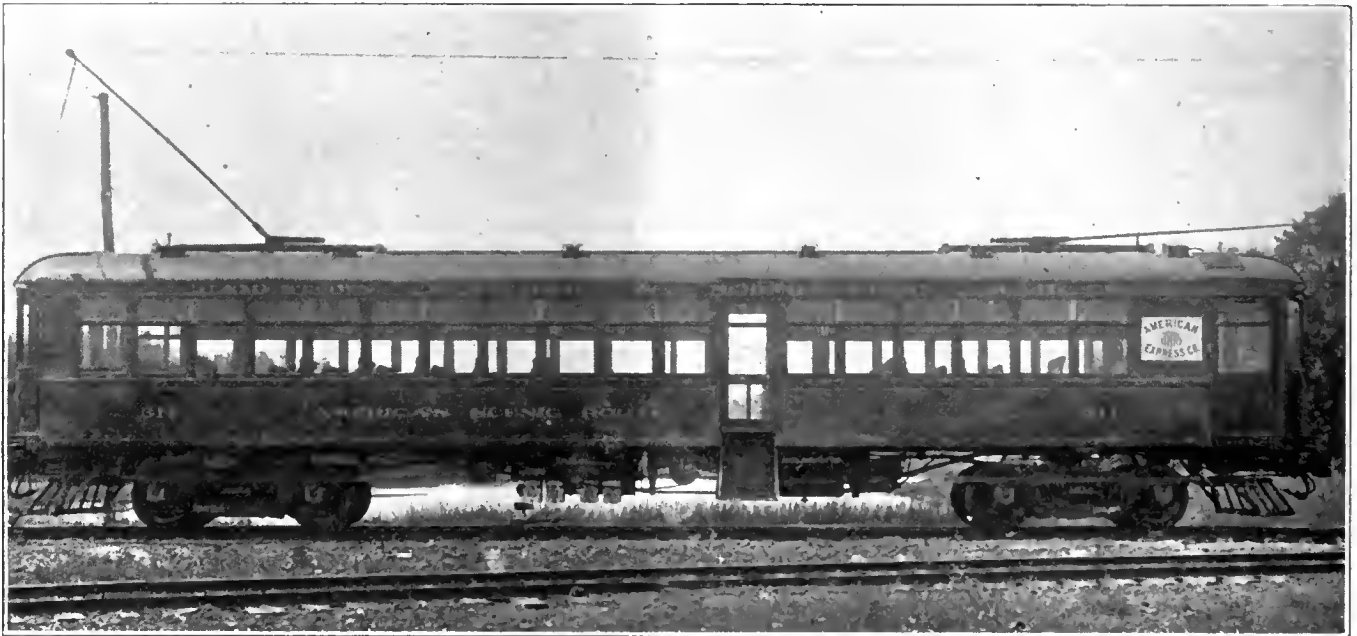


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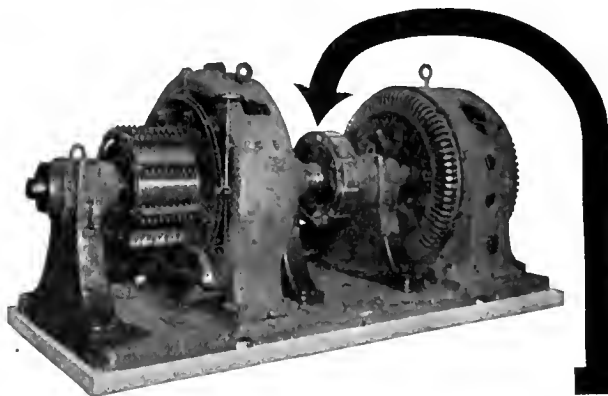
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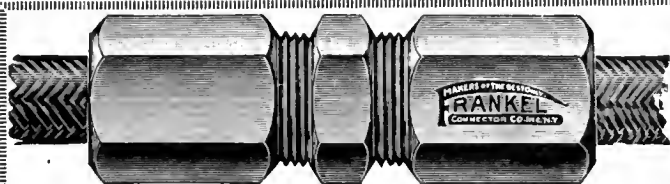


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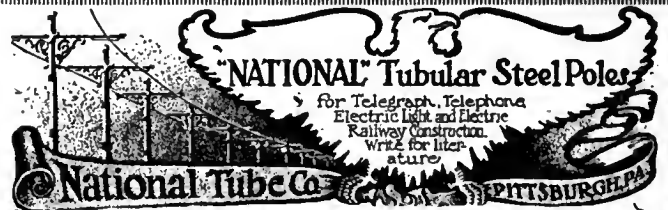
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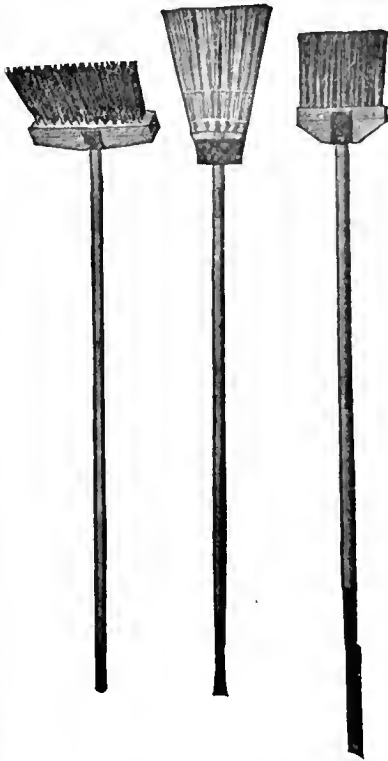
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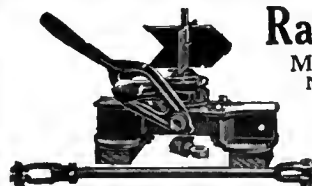
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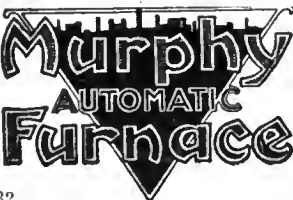
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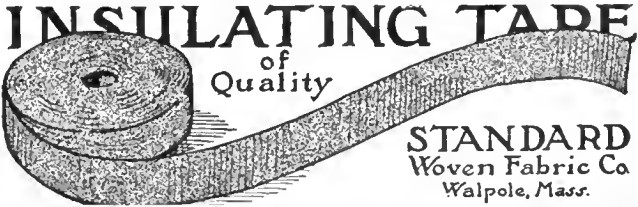
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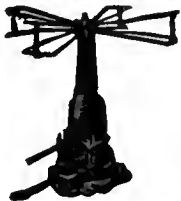


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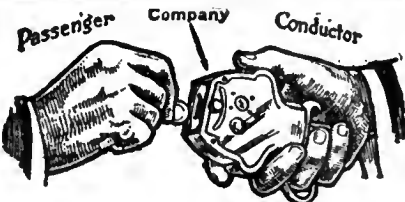
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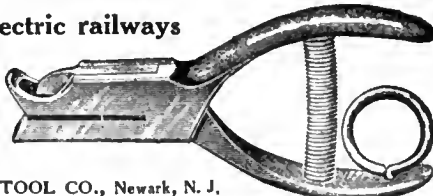
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**WANTED**—working car barn foreman for a small street railway system in Colorado. Man must be familiar with armature winding and competent to do and direct all car barn work. Address P-95, Elec. Ry. Journal, Chicago.

**WANTED** first class electric railway machinist, one who is familiar with all shop work necessary on city and interurban cars. Preferably a man who is capable of winding armatures. Good wages. Excellent working conditions. Reply immediately. P-96, Elec. Ry. Journal, San Francisco.

**ONE** railway armature winder wanted; wages 50c. per hour, and one air brake man. Columbia Ry. Gas & Elec. Co., Columbia, S. C.

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P97—Elec. Ry. Journal, Leader-News Bldg., Cleveland, Ohio.

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Second-hand, but guaranteed condition. Save money and get immediate shipment.

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6000-hp. National feed water heater  
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16 x 20 x 24-in. Blake vacuum pump.  
2—14 and 20 x 10 x 15-in. Worthington compound pumps  
20-hp. Lidgerwood, D.D. hoist, with 550-volt, D.C. motor.  
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Established 22 Years.

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**ASSISTANT** superintendent or despatcher of transportation department by man with 22 years' experience in transportation work. Good organizer. PW-74, Elec. Ry. Journal, Chicago.

**AUDITOR**, thoroughly capable in public utility accounting, solicits change. Sixteen years' experience, age 39, married, references. PW-73, Elec. Ry. Journal, Cleveland.

**ELECTRICAL** engineer, college graduate, 13 years' experience. Railway specialist with experience in construction, operation, valuation and handling of men. Reports and analysis made for engineering corporations, public authorities and operating systems. Examination made of properties and service rendered, traffic surveys, schedules and equipment, etc., with special attention to improvement to and economy of operation. PW-98, Elec. Ry. Journal Philadelphia.

**MASTER** mechanic; By a high grade technical and practical electric railway man with a successful record. Best references furnished. PW-90, Elec. Ry. Journal, Philadelphia.

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**GRADUATE** civil engineer. Ten years railway construction, maintenance, designs. At present engineer charge construction large Interurban Railway. Thorough maintenance of way experience. Age 36; married. References furnished. PW-91, Elec. Ry. Journal, Chicago.

**POSITION** as master mechanic wanted by man with experience both city and interurban. Can furnish best of reference. PW-87, Elec. Ry. Journal, Cleveland.

**PRACTICAL** man 15 years' experience as constructive foreman, steam and electric train service, dispatcher power economy instructor and trainmaster. Thoroughly familiar with economical high speed train operation. Multiple unit control, automatic air brake; 35 years old; married. Best references; present employers and others. Can handle men and obtain results. Desire to make voluntary change. PW-92, Elec. Ry. Journal, Chicago.

**WANTED** position as manager or general superintendent by a first class utility executive, 31 years of age and married. Thoroughly familiar with operation and general construction of electric light, power, gas, city and interurban railway properties. Will consider situations of from 25 to 50,000 population or the group management of the above class properties. At present connected but desire change for larger field. A good organizer, handler of men and the public. Can form new connections within 30 to 45 days. PW-89, Elec. Ry. Journal, Chicago.

### RAILS

100 tons 7-in. 70-lb. Shanghai Relays.  
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500 tons 100 lb. with angles. New.

Full stock all weights.

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- 3—175 KW. Westinghouse single-phase transformers, 13,200 volts primary, 390 volts secondary, oil cooled Switchboard complete.
- 1—300 KW. National Rotary Converter, type RT, 3-phase, 6-pole, 550 volts D.C., 330 volts A.C., 500 R.P.M. Switchboard complete.
- 1—300 KW. Stanley Rotary Converter, SKC, 3-phase, 6-pole, 600 volts D.C., 366 volts A.C., 500 R.P.M.
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SUPERINTENDENT of distribution in large railway property desires opportunity to show ability to handle successfully, larger propositions of railway light and power distribution; 20 years' experience in high and low tension construction and maintenance. PW-103, Elec. Ry. Journal.

GENERAL manager; American; 47 years of age; wide experience in high-class electric light; large power and electric railway designing; construction and operation desires position managing property or group of properties having gross earnings more than \$100,000 gross. Address Manager, Suite 716 61 Broadway, New York.

MASTER mechanic, now employed, seeks opportunity in middle West. Have had four years' transportation as assistant superintendent and superintendent; can make schedules, etc. Four years in charge of power and substations aggregating 1500 kw; five years with large electric railway manufacturer embracing manufacture of motors, generators, rotaries control engineering sales; three years in charge of repair and maintenance of cars and equipment as electric engineer and master mechanic. Have constructed new and reconstructed old cars and trucks; have had accounting as applied to electric railways by ICC. PW-104, Elec. Ry. Journal, Chicago.

#### POSITIONS WANTED

HIGH-GRADE operating man open for engagement as superintendent. Has high speed interurban, city and steam railroad experience of twenty years. First-class references; married; no preference as to locality. PW-99, Elec. Ry. Journal, Chicago.

SUPERINTENDENT or general line foreman can handle men and show results; familiar with catenary and direct suspension telephone and signals, transmission conduit, etc.; 25 years' experience; best of references, etc. PW-100, Elec. Ry. Journal, Cleveland.

ENGINEER executive wants position as manager of public utility. Technical graduate, fifteen years engineering and executive work. Splendid record and references. PW-101, Elec. Ry. Journal, Chicago.

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FS-84—Elec. Ry. Journal

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with Names of Manufacturers and Distributors

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Oxweld Acetylene Co.

**Advertising, Street Car.**  
Collier, Inc., Barron G.

**Air Cleaners.**  
Horne Mfg. Co.

**Air Rectifiers.**  
Holden & White, Inc.

**Alloys, Steel and Iron.**  
(See also Bearings and Bearing Metals.)  
Titanium Alloy Mfg. Co.

**Anchors, Guy.**  
Electric Service Supplies Co.  
Holden & White, Inc.  
Johns-Manville Co., H. W.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

**Anti-Climbers.**  
Railway Improvement Co.

**Armature Shafts.**  
Laclede Steel Co.

**Automobiles and Buses.**  
Brill Co., The J. G.

**Axle Straighteners.**  
Columbia M. W. & M. I. Co.

**Axles, Car Wheel.**  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Carnegie Steel Co.  
Laclede Steel Co.  
National Railway Appliance Co.  
St. Louis Car Co.  
Standard Steel Works Co.  
Westinghouse Elec. & M. Co.

**Babbling Devices.**  
Columbia M. W. & M. I. Co.

**Badges and Buttons.**  
Electric Service Supplies Co.  
International Register Co., The

**Batteries, Dry.**  
Johns-Manville Co., H. W.

**Batteries, Storage.**  
Electric Storage Battery Co.

**Bearings and Bearing Metals.**  
Ajax Metal Co.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
General Electric Co.  
More-Jones Brass & Metal Co.  
St. Louis Car Co.  
Westinghouse Elec. & M. Co.

**Bearings, Center and Roller Slide.**  
Baldwin Locomotive Works.  
Holden & White, Inc.

**Bearings, Roller and Ball.**  
Gurney Ball-Bearing Co.  
SKF Ball-Bearing Co.

**Bells and Gongs.**  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
St. Louis Car Co.

**Benders, Rail.**  
Niles-Bement-Pond Co.  
Zelnicke Sup. Co., W. A.

**Bollers.**  
Babcock & Wilcox Co.

**Boiler Cleaning Compounds.**  
Dearborn Chemical Co.  
Johns-Manville Co., H. W.

**Boiler Coverings.**  
Johns-Manville Co., H. W.

**Boiler Tubes.**  
National Tube Co.

**Bond Testers.**  
American Steel & Wire Co.  
Roller-Smith Co.

**Bonding Apparatus.**

American Steel & Wire Co.  
Electric Railway Improvement Co.  
Electric Service Supplies Co.  
Imperial Brass Mfg. Co.  
Ohio Brass Co.  
Oxweld Acetylene Co.

**Bonds, Rail.**

American Steel & Wire Co.  
Electric Railway Improvement Co.  
Electric Service Supplies Co.  
General Electric Co.  
Johns-Manville Co., H. W.  
Lincoln Bonding Co.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

**Book Publishers.**

McGraw-Hill Book Co., Inc.

**Boring Tools, Car Wheel.**  
Niles-Bement-Pond Co.

**Braces, Rail.**

Kilby Frog & Switch Co.

**Brackets and Cross Arms.** (See also Poles, Ties, Posts, Etc.)  
Bates Expanded Steel Truss Co.  
Electric Service Supplies Co.  
Hubbard & Co.  
Linsley Bros. Co.  
Ohio Brass Co.

**Brake Adjusters.**  
Holden & White, Inc.

**Brake Shoes.**  
Amer. Brake Shoe & Fdry. Co.  
Barbour-Stockwell Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
St. Louis Car Co.

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Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Holden & White, Inc.  
Horne Mfg. Co.  
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St. Louis Car Co.  
Westinghouse Trac. B. Co.

**Brooms, Track, Steel or Rattan.**  
Paxson Co., J. W.  
Zelnicke Supply Co., W. A.

**Brush Holders.**  
Anderson Mfg. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Eureka Co.

**Brushes, Carbon.**  
General Electric Co.  
Jeandron, W. J.  
Morgan Crucible Co.  
United States Graphite Co.  
Westinghouse Elec. & M. Co.

**Brushes, Graphite.**  
Dixon Crucible Co., Jos.  
United States Graphite Co.

**Bushings, Case Hardened and Manganes.**  
Bemis Car Truck Co.

**Bushings, Fibre.**  
Diamond State Fibre Co.

**Cables.** (See Wires and Cables.)

**Carbon Brushes.** (See Brushes, Carbon.)

**Car Equipment.** (For Fenders, Heaters, Registers, Wheels, etc.—See those headings.)

**Car Trimmings.** (For Curtains, Registers, Doors, Seats, etc.—See those headings.)

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American Steel & Wire Co.  
Brill Co., The J. G.  
Kuhlman Car Co., G. C.  
McGuire-Cummings Mfg. Co.  
St. Louis Car Co.  
Wason Mfg. Co.

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Electric Equipment Co.  
Wendell & MacDuffie Co.

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General Electric Co.

**Castings, Brass, Composition or Copper.**

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Eureka Co.  
Horne Mfg. Co.  
More-Jones Brass & Metal Co.

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Bemis Car Truck Co.  
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Horne Mfg. Co.  
St. Louis Car Co.  
Standard Steel Works Co.  
Union Spring & Mfg. Co.

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Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Horne Mfg. Co.  
St. Louis Car Co.

**Catchers and Retrievers, Trolley.**

Electric Service Supplies Co.  
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Swan, James T.

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General Electric Co.  
Westinghouse Elec. & Mfg. Co.  
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**Commutator Truing Devices.**  
General Electric Co.

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Eureka Co.  
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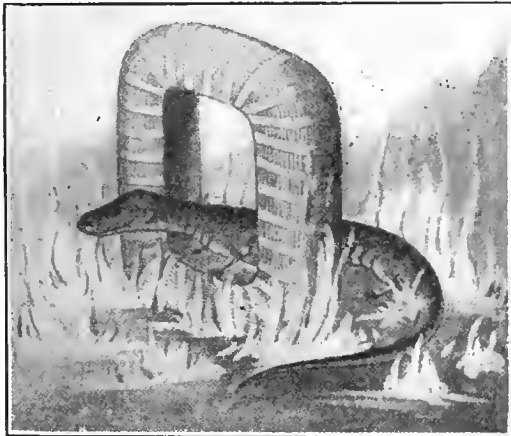
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Zelnicker Sup. Co., W. A.

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Arnold Co., The.  
Beeler, John A.  
Byllesby & Co., Inc., H. M.  
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Sanderson & Porter.  
Seefield Engineering Co.  
Sloan, Huddle, Feustel & Freeman  
Stone & Webster.  
Whito Companies, The J. G.  
Woodmansee & Davidson Engineering Co.

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Laclede Steel Co.  
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Hensley Trolley & Mfg. Co.  
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Nuttall Co., R. D.  
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### Headlights.

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General Electric Co.  
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Consolidated Car Heating Co.  
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General Electric Co.  
Holden & White, Inc.  
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(See also pages 58, 59)  
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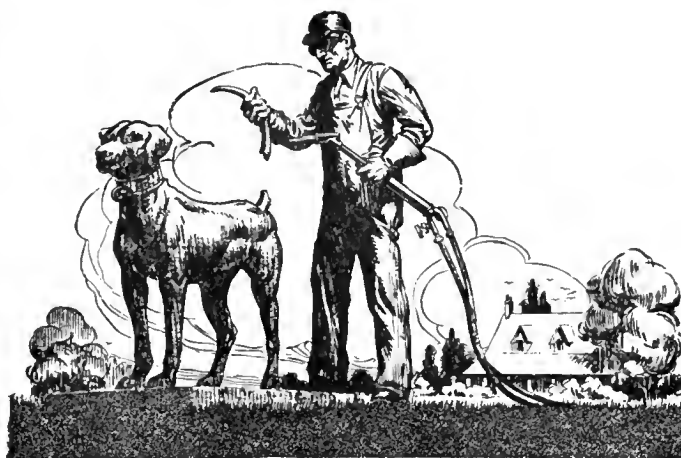
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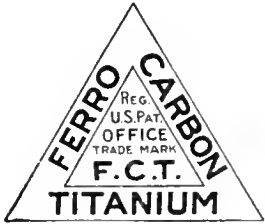
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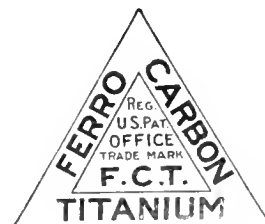


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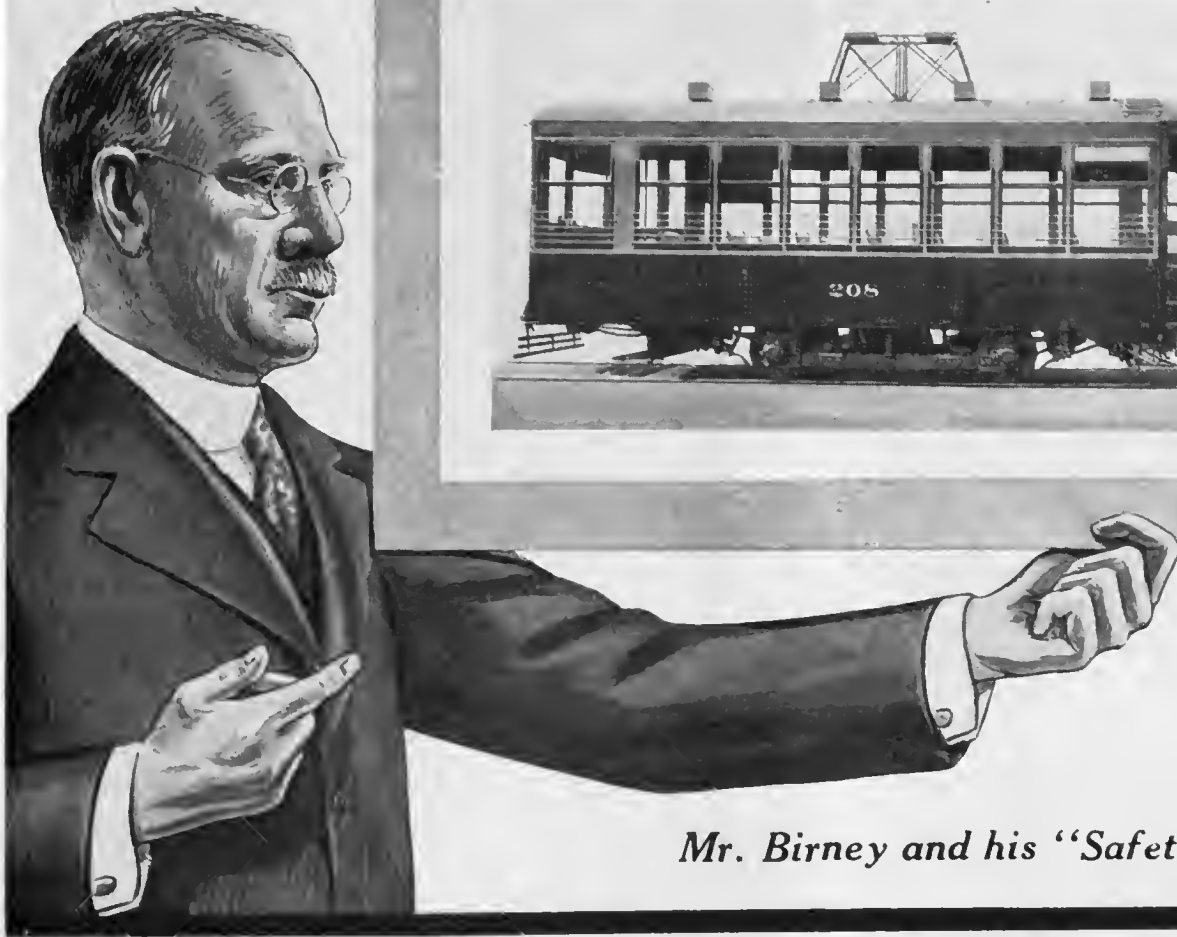
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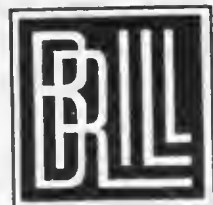


*Mr. Birney and his "Safety Car"*

## *The "Safety Car" Is the Universal Car*

Forty-four cities in twenty-four states and in Canada have gone in for "Safety Cars." Only a beginning, but plenty to show that it is the universal car of the electric railway field. It has "made good" everywhere. From everywhere reports have come in that it has won popular favor from the start and is a revenue producer. The point is, the need for "Safety Cars" is growing more insistent all the time, the demand for them fast getting bigger, railways that have them are calling for additional cars, and these are times when it is better to order cars as early as possible.

THE J. G. BRILL COMPANY, PHILADELPHIA, PA.  
AMERICAN CAR COMPANY, ST. LOUIS, MO.  
G. C. KUHLMAN CAR CO., CLEVELAND, OHIO  
WASON MANFG. CO., SPRINGFIELD, MASS.  
CIE. J. G. BRILL, 49 Rue des Mathurins, PARIS





**THE GOLDEN GLOW OF LIBERTY**

**MUST BE MAINTAINED BY**

**A GOLDEN FLOW OF CAPITAL**

**SAVE AND BUY**

**LIBERTY BONDS**

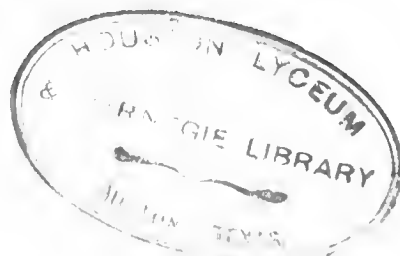
**GENERAL ELECTRIC COMPANY**

Staggered Hours for Labor Proposed for Washington

# ELECTRIC RAILWAY JOURNAL

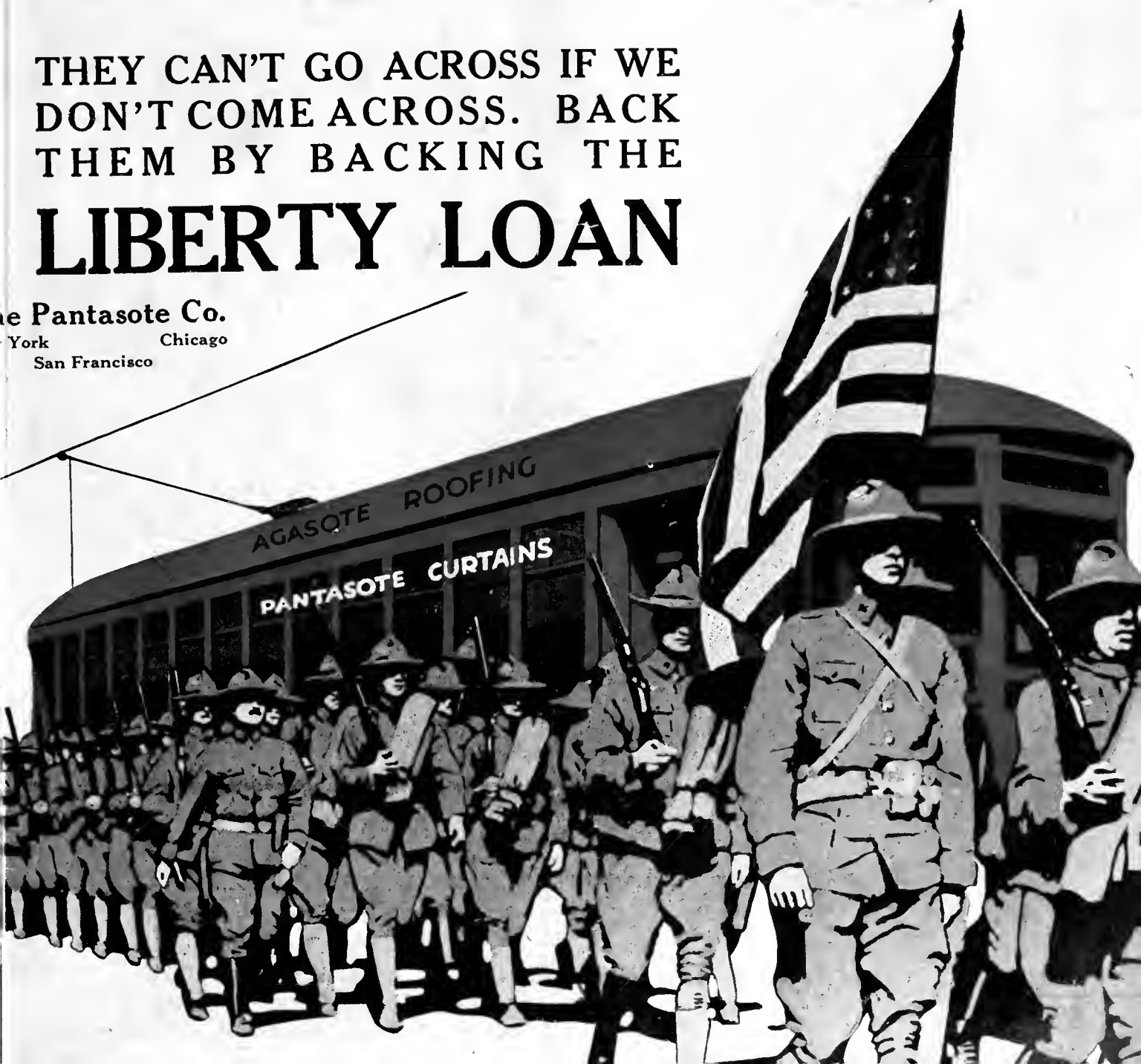
McGraw-Hill Company, Inc.

April 6, 1918



THEY CAN'T GO ACROSS IF WE  
DON'T COME ACROSS. BACK  
THEM BY BACKING THE  
**LIBERTY LOAN**

the Pantasote Co.  
New York Chicago  
San Francisco





# Electric Freight Haulage

will help your road and  
your community

EVERY ton of local freight you handle is just that much relief for the overburdened steam road serving your territory. With one, or two, Baldwin-Westingshouse Electric Locomotives you can arrange a schedule that will efficiently take care of freight in your off-peak hours, at rates that will be attractive to your patrons and profitable to your road.

Be progressive—analyze the possibilities in your territory, they may surprise you.

*Address either company*

The Baldwin Locomotive Works  
Philadelphia, Pa.

Westingshouse Electric & Mfg. Co.  
East Pittsburgh, Pa.

**Invest in Liberty Bonds, and Help Our Country**



# Electric Railway Journal

H. W. BLAKE, *Editor*

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## McGRAW-HILL COMPANY, INC., 10th Avenue, at 36th Street, NEW YORK

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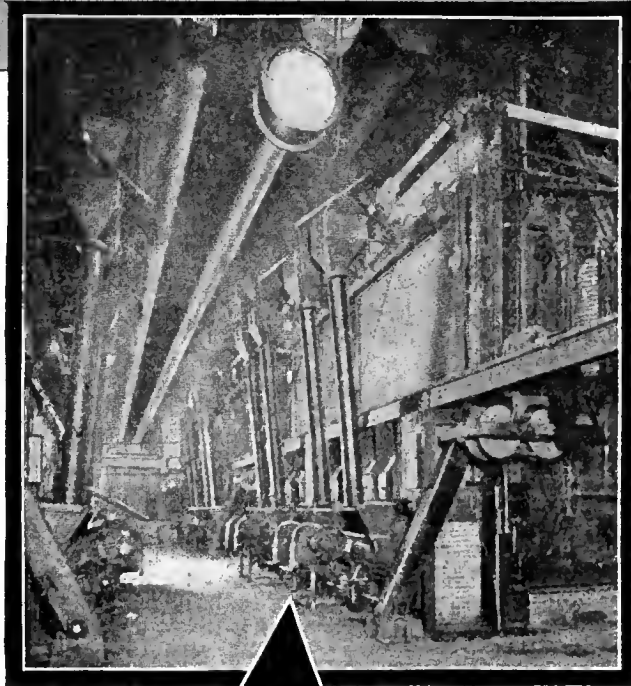
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# Westinghouse

## *Burning Low Grade Illinois Coal Successfully*



John Hunter, Chief Engineer of the Union Electric Light & Power Co., St. Louis, Mo., says—

“Heretofore there was little encouragement from any source outside of the manufacturer that successful operation could be obtained with this coal, (Low Grade Illinois) on this equipment.

“However, after six months’ operation, the success of the venture has been proved beyond a doubt.”

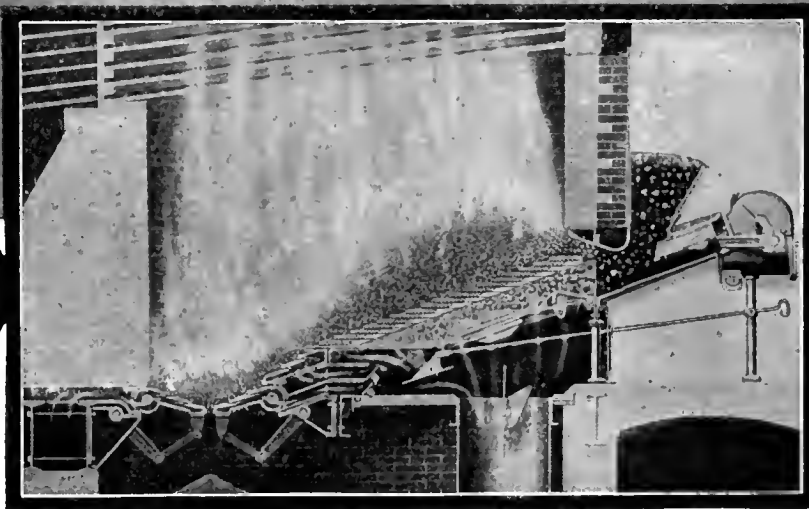
“Boiler ratings up to 200% are being carried continuously, with an overall boiler efficiency of 74.5%—this as opposed to approximately 65%, which was the maximum efficiency obtainable with our former stoker equipment.”

WESTINGHOUSE ELECTRIC & MANUFACTURING CO.  
East Pittsburgh, Pa.

**Invest in Liberty Bonds,  
and Help Our Country**

# Westinghouse

*Overall Plant Efficiency  
Raised From 65 to 74.5%*



## *The Westinghouse Underfeed Stoker*

—will burn satisfactorily—a wide variety of fuels—ranging from high-volatile Eastern to high-ash Western Coals and Lignite.

The selection of the Westinghouse Underfeed Stoker, which will burn many fuels satisfactorily, *is a precaution of inestimable value to-day.*

Are you prepared for the emergency?

# Meet the Wear at Its Source

That's what we do when we build into our air brakes those wear-resisting qualities obtained only by use of best designs, best materials and skilled workmanship. We weave into the fabric itself the element of enduring quality.



*Brake Building our Business for a Lifetime*

## Westinghouse Traction Brake Company

General Offices and Works, Wilmerding, Pa.

Atlanta, Ga.  
Boston, Mass.  
Chicago, Ill.  
Columbus, O.

Denver, Col.  
Houston, Tex.  
Los Angeles, Cal.



Mexico City  
New York, N. Y.  
Pittsburgh, Pa.

San Francisco  
Seattle, Wash.  
St. Louis, Mo.  
St. Paul, Minn.

## Tinkle, Tinkle, Little Car

Tinkle, tinkle, little car—if indeed that's what you are—running on the Summit line—how I wish that you were mine. I would put you in my flat as a playroom for our cat, so he couldn't catch our bird. You may think it sounds absurd; but when first the thing I spied, "Holy Smokes!" I wildly cried, "someone's child has strayed afar on his little kiddie kar."

When at length it came along, I decided I was wrong; thought it was the private bus of some plutocratic cuss, who prefers to ride alone with a street car all his own—or perhaps a circus van. Then it was the little man, seated on a stool in front, did a great magician stunt; pulled a throttle open wide, then a casement by his side folded up like some big fan. When this novel act began, down a tiny platform dropped and upon it people hopped, with their car fares in their hands. Then I saw a sight: My land!

Some had dollars, some had dimes. He makes change a dozen times, answers questions with a smile, hollers "Step up in the aisle"; pulls a lever here and there, regulating brakes and air. When he is prepared to go, shuts the bird-cage with his toe, moves a gadget with his knee—regulates the speed, you see—pulls the bell cord with his teeth, lest some folks get caught beneath. That would throw 'er off the track; maybe flop 'er on 'er back. Calls out names of every street, punches transfer with his feet. Thus he earns his daily pay, running cars out Summit Way. Worth a jinx, yea, and more, just to see him fold that door.—Seattle Post-Intelligencer.

# The POET

even  
saw the  
advantages  
of  
the

# Safety Devices on One-Man Cars

Poets are notoriously impractical. They walk with their heads up in the air—and stub their toes against the curb-stone.

But—the Safety Car, with its complete equipment of labor- and time-saving devices captured his roving poetical eye and held it!

The practical railroad man hardly needs poetry to impress him with the advantages of our devices—he knows!

If you don't—better ask us for our bulletins on the Safety Car.



## SAFETY CAR DEVICES CO.

Main Office—Boatmen's Bank Bldg., ST. LOUIS, MO.

CHICAGO  
Railway Exchange Bldg.

NEW YORK  
City Invest. Building

PITTSBURGH  
Westinghouse Building





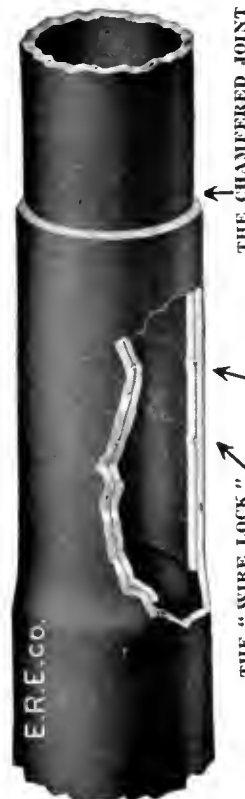
## The Lineman's Nightmare at Roanoke, Virginia

It requires but a single glance even for a layman, to realize what this maze of crisscross wires means to the lineman and trouble hunters.

The waste in wire, unnecessary labor and insulating material are plain to the practical railway and central station man.

But the waste was considered necessary, because—"one pole could not possibly carry all these wires."

Which may have been perfectly true of wooden poles, but is not true of Elreco tubular poles.



Above is shown the result of the installation of Elreco tubular poles. Strength and neatness fairly speak out of the clean, straight steel pole—and not the least gain of the city is the improvement in the outward appearance of its streets.

### Elreco Tubular Poles

Combine Lowest Cost  
Least Maintenance  
Lightest Weight  
Greatest Adaptability

**Equipment Co.**

New York: 30 Church St.

**Electric Railway**  
Cincinnati, Ohio

Observe the  
WIRE LOCK





# PRODUCTS

## Better Bonds—Less Motor Trouble

How many cars are laid up in the shops with burnt-out armatures?

Low voltage causes most burnt-out armatures. Quite probably the low voltage is caused by a poorly bonded return circuit.

The remedy is good bonding. It will help to keep the cars out of the shop and on the track, earning fares.

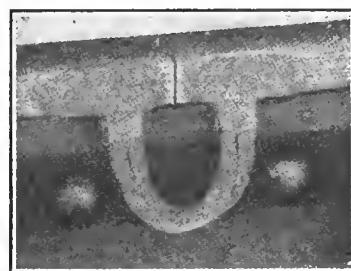
There are other profitable results—saved power, better schedules, improved car lighting.

Every day means a loss until good bonding is installed. O-B Bonds are good bonds as scores of roads will testify.

*Prompt shipment of any standard type.*



O-B Compressed Terminal Bond  
(Patented)



O-B Gas Weld Bond  
(Patented)

**The Ohio Brass Company, Mansfield, Ohio**

New York   Philadelphia   Pittsburgh   Chicago   Los Angeles   San Francisco



# Phono-Electric

Collecting 300 Amperes at  
11,000 Volts—Since 1908

is not proving a difficult task on the New Haven electrification.

Few electrified roads carry so many tons per mile and give so much care to the question of absolute reliability in its distribution system.

That's why more than 80 per cent. of the contact wire between New York and Stamford—a four-track line—is Phono-Electric.

—the wire that wears long and evenly despite the service demands placed upon it in operating heavy passenger and freight trains at high speeds and high voltages.

**Bridgeport Brass Company**  
**Bridgeport** **Connecticut**

# Why INTERNATIONAL STEEL TWIN TIES Are Superior

They are designed to give the most service with the minimum amount of materials. The large tie bearing plate at the top instead of the bottom of the tie and parallel with the rail, puts all the concrete or ballast to work. The trussing of these plates gives them bending strength and forms a tamping pocket. In the case of a concrete foundation this trussing grips the set concrete and insures a full distribution of the track loads.

By offsetting the rail fastenings from the tie anchorages or the channels, the rail wave is not retarded. The clips are malleable iron castings of the tapered jaw type. They clamp the rail to the tie plate and resist shock and movement with a  $1\frac{1}{4}$  in. square section of metal.

Seven inches instead of 12 in. of concrete beneath your rail gives track a resiliency not obtainable with any other type of construction. This is largely responsible for the excellent results these ties are giving in service. And when the track structure must be removed it is much simpler to remove 7 in. of concrete than 12 in. A combination of all permanent materials makes such a requirement very remote.

These are all engineering considerations which are worth your attention. The design is right, the cost is low and the service of Steel Twin Ties is unexcelled.

*Prompt deliveries made from stock.*



Permanent Track at Less Cost  
Any Type Base — Open or Paved Track

## The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES:

Western Eng'g Sales Co.,  
Los Angeles, Cal.

San Francisco, Cal.  
Seattle, Wash.

R. J. Cooper Co.,  
Salt Lake City, Utah.

J. E. Lewis & Co.,  
Dallas, Texas.

Maurice Joy,  
Philadelphia.

William H. Ziegler,  
Minneapolis, Minn.

# These Raceways Do Not Pit Nor Wear

This is one of the chief points of superiority in the Hartman centering center plate. The large diameter balls,  $2\frac{1}{8}$  inches, carry the load over such an area of the raceway that pitting and wearing is prevented.

Thus a line contact is provided instead of a point. And these balls do not wear and will not crush.

This statement is proven by over 200,000 Hartman bearings in service on electric and steam railway cars. 72% of our monthly orders come from electric railways for installation on additional cars after test on partial equipment.

## Holden & White Inc.

Electric Railway Distributors for The Joliet Railway Supply Company

1508 Fisher Bldg., Chicago

National Rwy. Appliance Co., New York, Washington; Grayson Rwy. Supply Co., St. Louis; W. M. McClintock, St. Paul; Alfred Connor, Denver; C. E. A. Carr, Toronto; F. F. Bodler, San Francisco; S. I. Wallis, Los Angeles; W. F. McKenney, Portland; O. H. Davidson Equip. Co., Salt Lake City.

See Page 11

of our Perry Hartman Bearing catalog for complete description of this device and how it can be applied to OLD CARS. Copy free on request.



# Hartman

## Centering Center Plate

# *Don't Use Batteries*

*when you can buy*

## *Faraday High Voltage Car Signals*



Buzzer



*The assurance of continued operation of signals and the elimination of the cost of batteries fully warrant the installation of Faraday High Voltage Car Signals on every car. Descriptive matter at your request.*



Bell



Resistance



Push Button

## **ELECTRIC SERVICE SUPPLIES Co.**

*Manufacturer of Railway Material and Electrical Supplies*

PHILADELPHIA  
17th and Cambria Sts.

NEW YORK  
50 Church St.

CHICAGO  
Monadnock Bldg.

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg



# AUTOMATIC BLOCK SIGNALING *for* PROTECTING HIGH SPEED TRAFFIC

## RESULTS COUNT

**P**ERFORMANCE is the real test of signal apparatus. Union automatic signals are working on the Pacific Electric Railway with only one failure in 300,000 signal functions.

The ultimately satisfactory performance of a signal system depends upon the apparatus used. No scheme of control is sufficient in itself. It can function only as accurately and reliably as the apparatus allows.

*Union signal appliances are the result of over thirty years' development and service.*

ON THE  
PACIFIC ELECTRIC RY.



# Union Switch & Signal Co.

SWISSVALE, PA.



Hudson Terminal Bldg.  
NEW YORK

Canadian Express Bldg.  
MONTREAL

Candler Annex  
ATLANTA

Represented by the GENERAL ELECTRIC CO. in Australasia, South Africa and Argentina

Peoples Gas Bldg.  
CHICAGO

Railway Exchange Bldg.  
ST. LOUIS MO.

So. Pacific Bldg.  
SAN FRANCISCO





Reason 4

for

# "COPPERWELD" TROLLEY WIRE

"Copperweld" trolley wire has no tendency to break even after 20 to 30 per cent. wear of cross-section, since the enormous tensile strength of the steel core is practically unaffected.

It is well known that a copper trolley wire is unsafe after it has been worn to any such percentages as those stated.

The direct reason is not the degree of wear but the inability of copper to stand hammering and pounding.

Crystallized copper, no matter how little worn, is always subject to breakage.

"Copperweld" trolley wire, because of its steel core, will wear safely to a much greater degree than is possible with copper.

General Sales Office  
Page Steel and Wire Co.  
30 Church St., New York



Western Sales Office  
Steel Sales Corporation  
Chicago, Illinois

Made from the product of the Copper Clad Steel Co., Pittsburgh, Pa.  
Drawn and sold exclusively by

# PAGE STEEL AND WIRE COMPANY

## MONESSEN, PA.

ESTABLISHED 1883



# CHAPMAN AUTOMATIC SIGNALS

## *For Electric Railways*

Chapman Automatic Signals are noted for their dependability—they can be relied on at any and all times under every condition. The many inter-urban electric railway systems that have adopted Chapman Signals have had remarkable service from this equipment. And the cars make better time, the safety of the passengers and crews is increased and the liability of damage to rolling stock is greatly lessened.

The signal is given by an 18-inch red semaphore arm on a 24-inch white hooded dial. The arm is plainly visible night or day under any weather condition.

The Chapman system is reliable, durable and economical.

Full details in booklet.

## Charles N. Wood Co.

14 Federal Street, Boston, Mass.





These Poles Have Carried Heavy  
Loads Since 1898—Over 19 years

# *Northern White Cedar Poles*

These 40-foot Northern White Cedar Poles located at the West Spring Street Power House of the Columbus Railway, Power and Light Company, Columbus, Ohio, and carrying the main leads, have rendered sturdy service for over 19 years.

## **They Support This Load:**

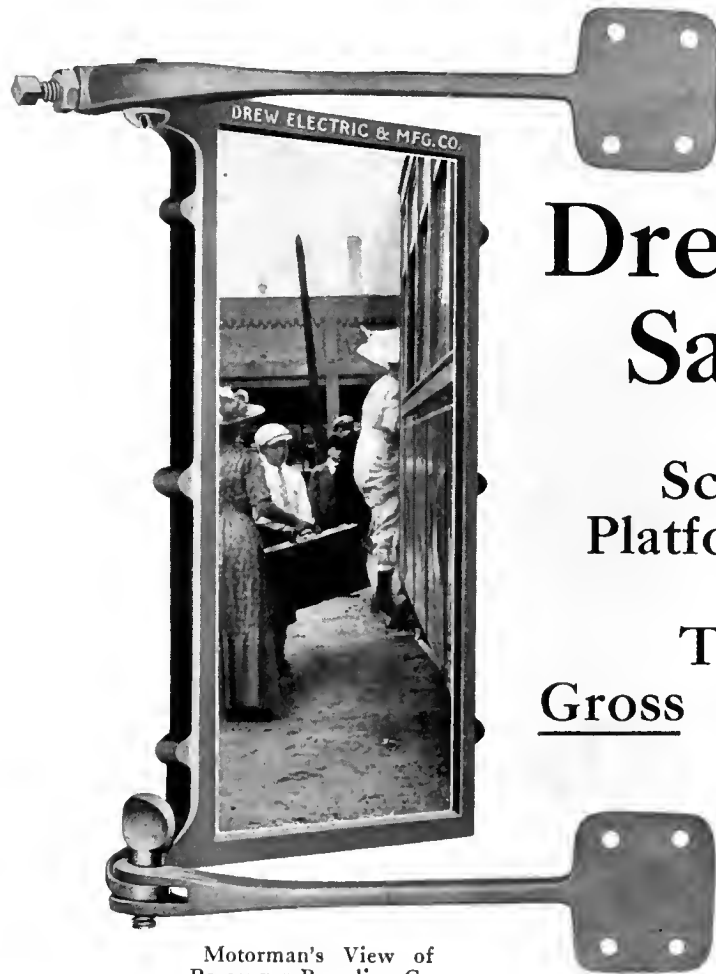
21—500,000 C.M.	W.P. Stranded	25—4/0 W.P. Solid
2—300,000 C.M.	W.P. Stranded	4—3/0 W.P. Solid
5—250,000 C.M.	W.P. Stranded	

*Northern White Cedar Poles* are durable and strong. They are light in weight, compared with other pole timbers, and they are also soft, allowing the spikes of the climber to enter readily.

## *The Sturdy, Attractive Line*

**NORTHERN WHITE CEDAR ASSOCIATION**  
Lumber Exchange, Minneapolis, Minn.

# "SAFETY FIRST" Made Easy



Motorman's View of  
Passenger Boarding Car.

## by the use of Drew Motorman's Safety Mirrors

Schedules are Improved  
Platform Accidents Eliminated  
and  
That Big Gap Between  
Gross and Net Income Reduced

Every time one of your cars starts from the barns, it is a potential source of damage claims arising from platform accidents. Just one accident avoided through the use of Drew Motorman's Safety Mirrors may pay for equipping every one of your cars with this great safety device.

The Drew Safety Mirror is the Motorman's check on the Conductor's "stop" and "go" signals. Details furnished on request.

## Other Drew Money Savers

Drew Pole Sleeves—Make Old Steel Poles as Good as New.

Samson Splicers—"Least cost per car mile."

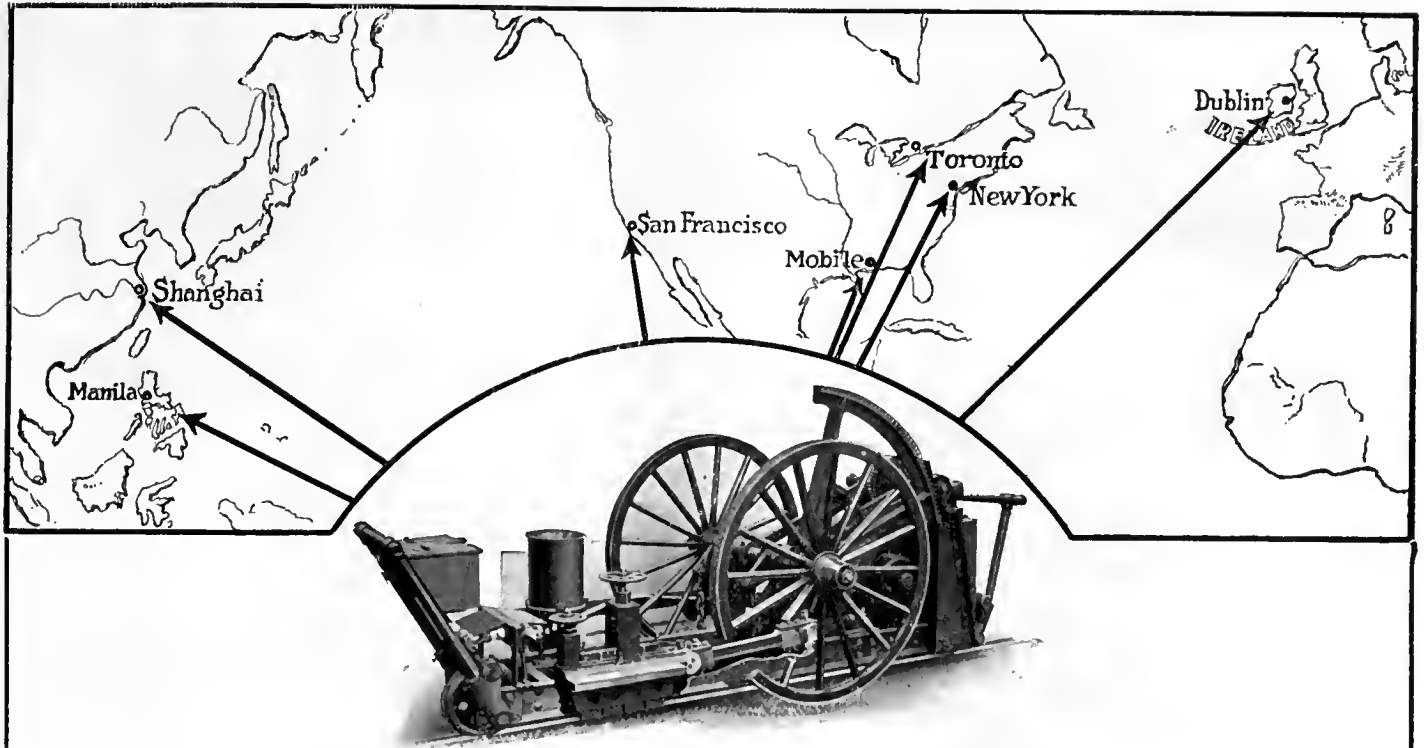
Drew Frogs and Crossings—Obviate "trolley off."

Drew Clinch Ears—Absolutely dependable.

*Send for Drew Catalogue No. 18.*

**Drew Electric & Manufacturing Company**  
Offices and Works, 1016 E. Michigan St., Indianapolis, Ind.





# A World-Established Fact

Whatever the general conception may be with regard to track grinding equipment, *this* fact is solidly established. Nearly one hundred electric railway companies in the United States and foreign countries are regularly using

## The Reciprocating Track Grinder

and are universally reporting that its results are completely and thoroughly satisfactory.

Many of these companies operate the most highly organized and modernly equipped properties in existence.

They are finding Reciprocating Track Grinders a profitable investment and a sure means to economy.

You can make these machines save money for you.

### RAILWAY TRACK-WORK COMPANY

30th and Walnut Streets, Philadelphia

AGENTS: Holden & White, Inc., 343 S. Dearborn St., Chicago.

Wigmore, Hall & Co., Pacific Electric Bldg., Los Angeles, Cal.



"Simplex" Joint  
for High Tee Rail



## The Editors Asked:

"What piece of special machinery or special tool has been the greatest labor saver on your property or properties in way department work?"

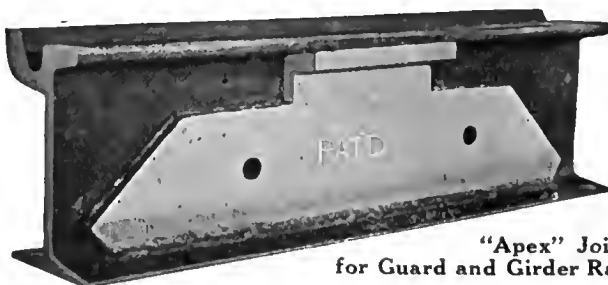
## Four Important Engineers Answered:

Taking all in all it is my opinion that the electric welding machine has been the greatest labor saver in the track department. It saves materials as well as labor. Instead of renewing a frog, for instance, the points can be rebuilt by welding. Your second question is difficult for us to answer because conditions vary on our different properties. We think the welding machine comes first and a concrete mixer is considered generally a necessity and might come second, and the same is true of the power drill.

As you know I am not in close enough touch with actual operating conditions to reply in respect to the labor-saving features of the tools mentioned. In respect to their values in maintenance work, however, I would place the arc welder in connection with the grinding machine easily first in importance.

Answering question 1, I should put arc welders first. I should arrange the equipment in question 2 in the following manner: Arc welder, acetylene cutting flame, air tamper, crane car, concrete mixer, portable stone crusher.

In answer to your request would state that the arc welding outfit to be the most useful apparatus. I should arrange in the following order the list given in question 2: Arc welder, crane car, power drill, air tamper, automatic dump car, electric shovel, concrete mixer, pavement plow, concrete breaker, acetylene cutting flame.



"Apex" Joint  
for Guard and Girder Rail

*A clean-cut, straightforward question and its clean-cut, honest replies.*

Indianapolis Switch & Frog Company, Springfield, Ohio

# Lackawanna Steel Sheet Piling for railroad construction work

**A**MERICAN railroads bought about 2000 tons of Lackawanna Steel Sheet Piling during 1917 for construction and permanent protection of bridge piers, for temporary and permanent retaining walls, for use in grade elimination work, etc.

Those roads whose maintenance departments keep a stock of Lackawanna Sheet Piling on hand as permanent equipment find this material an invaluable help in repairing washouts and on other emergency jobs.

Lackawanna sections are made in a wide range of types and sizes from which

at least one can be selected for safety and economy under practically any given conditions.

The Lackawanna flexible interlock is not only superior in strength and watertightness, but permits obstructions in the piling line to be passed without undue deflection, and is adapted to the construction of irregular walls and small circular enclosures.

Our Sheet Piling Engineers will gladly cooperate in determining the most desirable methods and sheet piling sections for difficult work and will submit valuable cost data.

Send for our book, "Lackawanna Steel Sheet Piling"

333



LACKAWANNA  
STEEL SHEET PILING

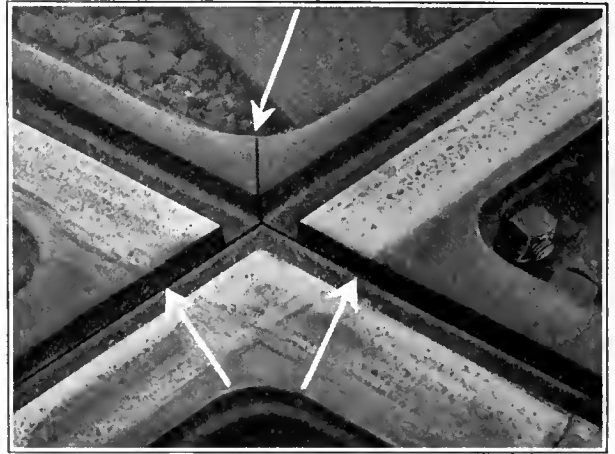
**Lackawanna Steel Company**

LACKAWANNA, N. Y.

ATLANTA CHICAGO DETROIT ST. LOUIS  
BUFFALO CLEVELAND PHILADELPHIA  
BOSTON CINCINNATI NEW YORK  
SAN FRANCISCO HAVANA



What Happens to a Rolled Rail Crossing



Joints In Balkwill Articulated Cast Manganese Crossings are life savers. They positively prevent breakage at flangeway intersections, permitting 100% wear before renewal

## Why Balkwill Articulated Cast Manganese Crossings Are Superior to Rolled Rail Crossings

This picture at the left shows where breaks in the main steel filling or backbone of rolled rail crossings are usually found.

These breaks are unavoidable because of the lack of flexibility of the rolled steel filler at the flangeway intersection.

In the Balkwill Articulated Cast-Manganese Crossing the difficulty is

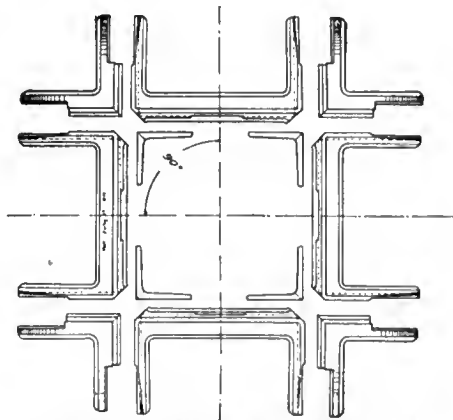
corrected by placing scientifically designed joints at the very places where breakage formerly occurred.

The lower first cost of a rolled rail crossing is therefore not a lower overall cost because it takes several rolled rail crossings to equal the life of one Balkwill Articulated Cast Manganese Crossing. Therefore the Balkwill Crossing is the cheapest in the long run. It gives

### MORE WEAR PER DOLLAR THAN ANY OTHER CROSSING YOU CAN BUY

It saves interruptions to traffic, makes less demand on labor, which is now so scarce, and also reduces the cost of making replacements frequently.

Write us for data on existing installations. If your special work manufacturer cannot get prompt deliveries of manganese castings or has not taken out a license to manufacture these crossings, **DON'T ACCEPT A SUBSTITUTE** but write us direct and we will see that your requirements are taken care of.



Joints at the flangeway intersections of Balkwill Articulated Cast Manganese Crossings positively eliminate breakage

**Order Balkwill Articulated Cast Manganese Crossings  
Direct from Your Special Work Manufacturers**

# **The Balkwill Manganese Crossing Co.**

506 Williamson Building, Cleveland, Ohio



## *Where Voltage is Low*

as, for instance, at the end of the line, the Erico Portable Welder shows its great flexibility and usefulness as clearly and undeniably as anywhere else along the track.

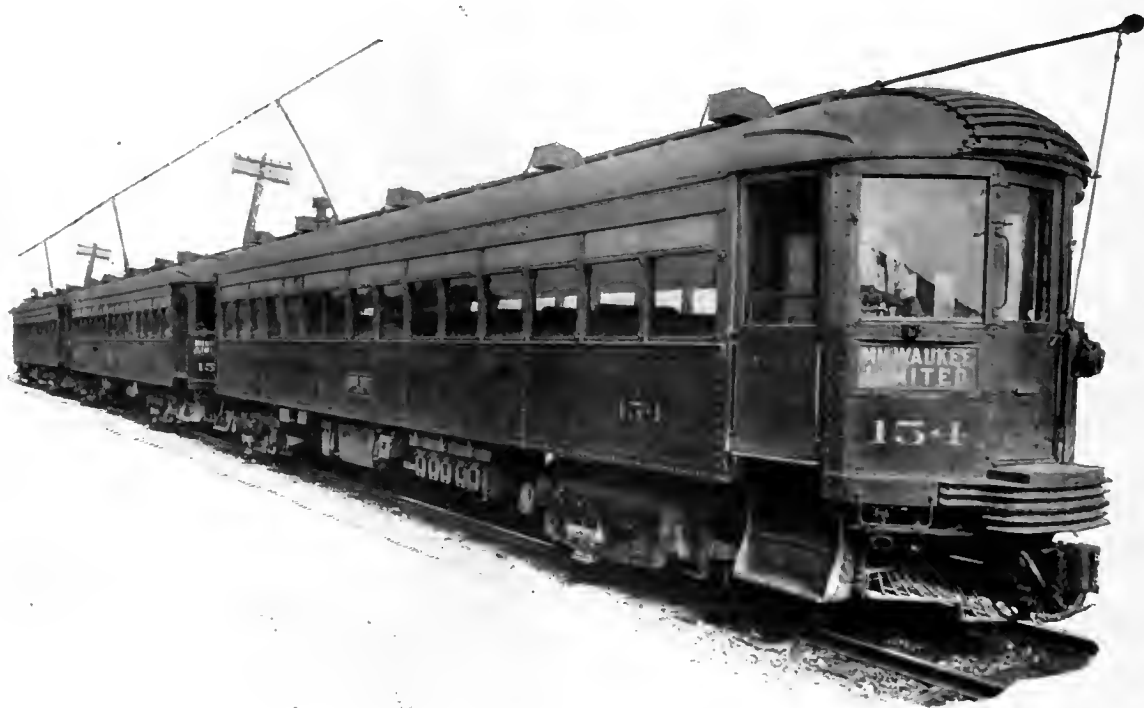
Switches are so arranged that the outfit will weld rail bonds on voltages from 250 to 750.

Full information on request.

**The Electric Railway Improvement Co.**  
Cleveland, Ohio



# Chicago, North Shore & Full Equipment of



**T**HE famous Gold Coast Limited and all other trains of the North Shore Route are soon to be equipped with Sangamo ECONOMY Meters.

This double-track road is second to none for heavy, high-speed interurban service. Trains of three and four steel cars (including parlor and dining cars), each equipped with four 140-hp. motors, make the 72-mile run between Milwaukee and Evanston in two hours' time.

Special trains are operated in and out of Chicago over the Chicago Elevated Railways. The North Shore Route is operated under the guidance of the officials of the Chicago Elevated Railways.

Energy-savings through the use of Sangamo ECONOMY Meters have been effected by the North Shore Route since January, 1915.

**Economy Electric**  
Old Colony Bldg.,

# Milwaukee R. R. Installs Economy Meters!

NO MYSTERY surrounds an energy - saving campaign using ECONOMY Meters. The management employs direct methods. It meters the *energy consumed at the cars*—just what it is trying to save.

Every step is readily appreciated by the motorman. He "*sees what he saves.*" He grasps quickly the fact that the less time his controller is on the more power he saves. And because he writes his own "power bills" and can make comparisons with his fellow employees, his *co-operation* is assured from the start.

That's the psychology of maintaining economy! It's the ECONOMY Meter Method!

Remember: Energy saving in car operation is merely the exercise of good judgment—all the time.

The ECONOMY Meter shows the motorman how to exercise that good judgment. It is an "open face" device.



*"The Watchdog of Your Power"*



*Mailed on Request*

ECONOMY Meters installed on your cars will conserve energy and equipment, promote safe operation and encourage good public service.

Install the ECONOMY Meter and METER THE ENERGY. *That's what you want to save.*

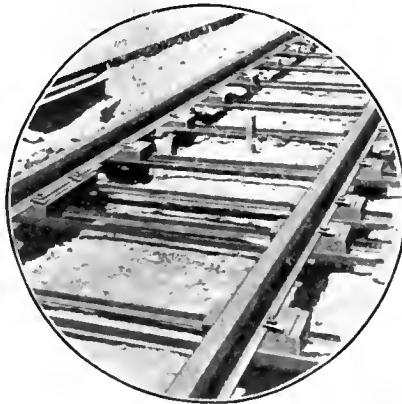
If you haven't our new booklet on efficiency in Electric Railway Operation, write for it. You will find it highly informative.

**Devices Company**  
Chicago, Illinois



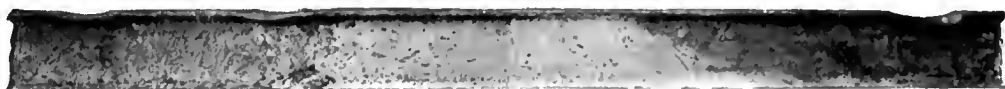
The asphalt cushion in D-M Ties  
saves your rails, your track and  
your rolling stock

A 6" Steel I-Beam used  
as a Tie showed  
Indentations like  
**THIS!**



What must have been  
the effect on the roll-  
ing stock to produce a  
dent like  
**THIS?**

In the above small circular picture is shown  
a stretch of new track with D.M. Ties,  
ready for the concrete to be poured in to  
make a unit structure.



When a steel I-Beam fully 6 in. deep can  
be hammered and distorted as shown in this  
picture, enormously powerful blows must  
have rained upon it. It was the absence of  
a resilient cushion that made this tie suffer.  
Such destruction could not have occurred to  
D.M. Ties, which have wooden blocks, set  
in asphalt, joined by steel twin bars.

*Rigid—Resilient—Permanent.*

*Ask for details*

**THE DAYTON MECHANICAL TIE CO.**

201 Third Street Arcade  
DAYTON, OHIO





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The First Woman Guard on the New York Municipal Railway's Rapid Transit Cars, 250 of which have National Pneumatic Door Engines

# Women "Making Good" *by the* Thousand

Recently an official of the Brooklyn Rapid Transit System and New York Municipal Railway referred to the women conductors and guards on his system in these terms:

"These plucky women have rendered a great public service and are proving their ability to fill a man's job."

And, as the Electric Railway Journal says in its issue for Feb. 23, more than 2000 women are already employed by the electric railways in New York and vicinity for platform and other service.

Hundreds of them are on cars equipped with National Pneumatic Door and Step Control.

If you want to put car platform requirements on the simple basis of fare collection with all heavy manual labor eliminated, we can fit your present air-brake cars with National Pneumatic Door and Step Control at modest cost. What are your requirements?

## NATIONAL PNEUMATIC COMPANY

INC.

50 Church St. New York



515 Laflin St. Chicago

## *It Interests the Motorman Intensely*

# The Arthur Power-Saving Recorder



Shows how many minutes the Power is on.

Counts how many stops and slowdowns are made.

You want the motorman to shut off the power as soon as possible and run with power shut off for as long as possible. This is the economical and safe way to run a trolley car. *The upper dial encourages the motorman to do this.*

Then again, you want motormen to avoid running at too high speeds, to coast along cautiously and avoid running too close to the car ahead; to stop "jamming the air" when making a stop, and avoid making unnecessary stops and slowdowns. *The lower dial encourages this kind of operation.*

From such a record the Company can determine exactly how efficiently and safely each motorman is operating in comparison with every other motorman on the same line—and the motorman can see for himself exactly what sort of record he is making and how and to what extent he is improving that record from day to day.

The great big value of any device for checking the use of power and increasing safety, rests in securing the full interest and cooperation of the men. The Arthur Recorder does this in a very simple and effective manner.

**The Arthur Power-Saving Recorder Co.**

Second National Bank Building, New Haven, Conn.

*"Power wasted is the true measure of the motormen's relative efficiency"*



CROUSE-HINDS

# Safety Panels



"Which button  
next, Daddy?"

*New Catalog Bulletin No. 1 D now Ready  
Write for Your Copy Today*



**CROUSE-HINDS COMPANY**  
SYRACUSE, N. Y., U.S.A.

NEW YORK

BOSTON

CHICAGO





## Women are Operating Successfully These Brooklyn Cars Equipped with **CONSOLIDATED DOOR ENGINES**

In 1912, when the Brooklyn Rapid Transit System installed 101 center-entrance cars, it equipped them with Consolidated Door Engines.

In 1917, when the Brooklyn Rapid Transit System found it increasingly difficult to fill war-time losses with men, it began to employ women as conductors on these cars.

**For a modest sum you can equip your cars with  
the New Consolidated Door Engine  
*for easy operation by Women Conductors***

The new Consolidated Door Engine has many qualities that will commend themselves to you, your operators and your passengers. Among its features are:

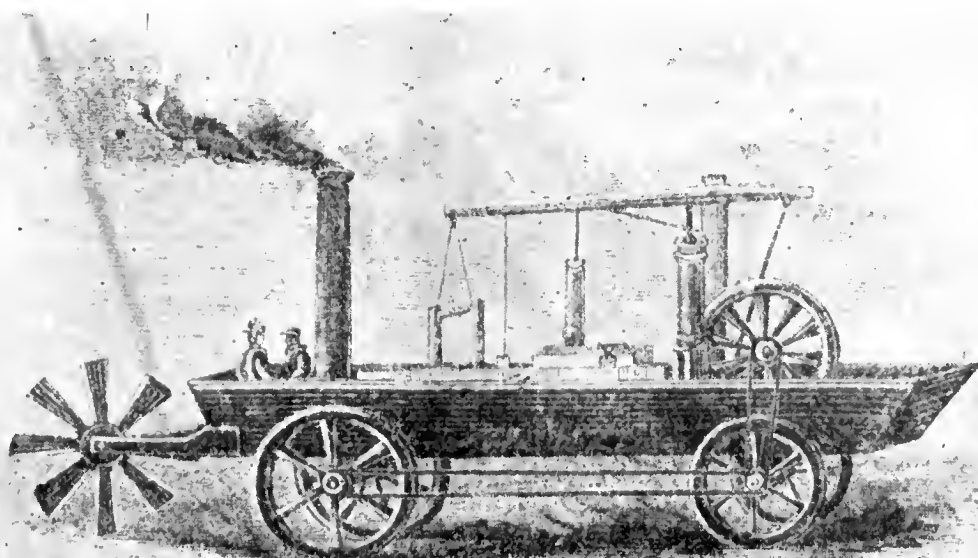
Can be adjusted for any speed of travel desired. Doors can be opened by hand from any intermediate position. Doors cannot slam upon release from any position of

travel. Door operation can be reversed instantly at any point of travel.

No air is on engine when doors are either fully opened or closed, thus increasing life of leathers and eliminating air leakage.

It will pay you to abolish heavy hand labor on cars.

**CONSOLIDATED CAR HEATING CO., ALBANY, N. Y.**



**O**LIVER EVANS' Steamboat of 1804 was built at Philadelphia for use as a river dredge. To convince people that steam power could be used for operating land vehicles he placed wheels under the dredge and ran it through the streets from Center Square to the Schuylkill River at Market Street under its own power.

## This Convinced the Skeptics

who thought it impossible to operate a carriage by steam power. Yet only twenty-six years later the first American built locomotive was constructed for the Charleston & Hamburg Line and was successfully pulling loads heavier than those predicted by the most optimistic minds.

With the steady improvement in railway efficiency, the constant progress to greater loads, higher speeds, and better traffic conditions, new demands naturally arose for better materials in all departments of the business.

Not the least important of these was the demand for more efficient lubrication.

As usual, the need brought the supply.

# Galena Oils

were tried by a few railroads at first. Their superior value was demonstrated beyond question. Their use increased rapidly. As lubricating demands became more exacting, Galena Oils met the new conditions.

Galena Service was developed and broadened so that the cost of lubricating railway equipment could be reduced and better lubricating methods would be adopted by the industry.

Today Galena Oils and Galena Service are lubricating the equipment of practically every steam railroad and most of the electric railways of the United States and Canada.

# Galena-Signal Oil Co.

## Franklin, Pa.

## TROLLEY WIRE

### Round Grooved and Figure 8

If you will agree that one make of trolley wire is able to give longer service than another make—

That one is more economical than another—

Then investigate our trolley wire with a view to cutting your wire costs.



## Weatherproof Wires and Cables

### Star Brand

Star Brand Wires are made with long service as the most prominent feature.

Because of their ability to render long service they cut wire costs.

Read the words in the cut of the star.

# American Electrical Works

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## Here's the Point

where you want the Material Dumped. Not half of it over the track.

## THE DIFFERENTIAL Electric Dumping Car

places its contents well away from the track, leaving a clear road for operation. Cars are built entirely of steel, and a small individual motor for each car enables an entire trainload to be dumped safely by a single unskilled laborer.

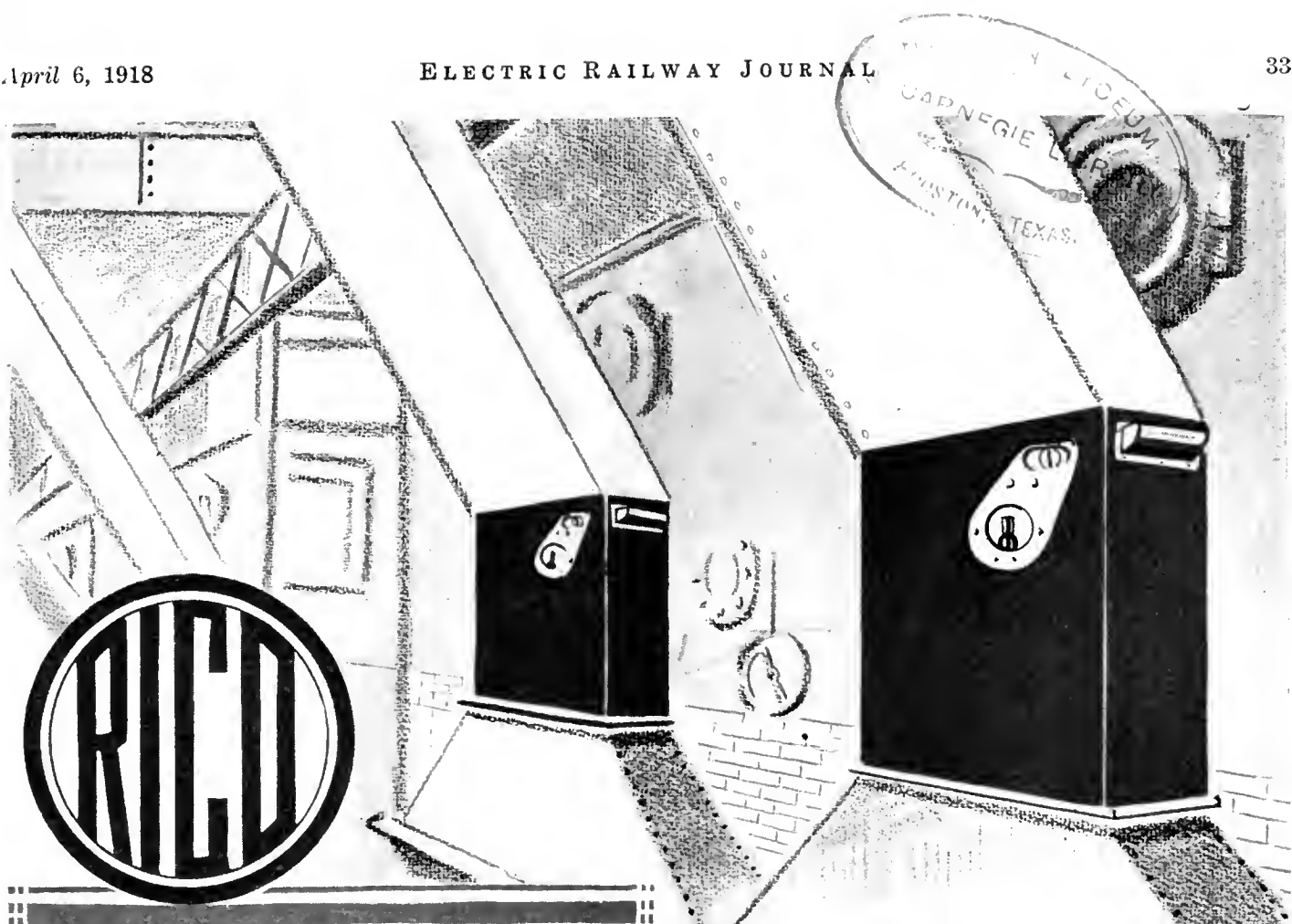
The body is very low and light and can be loaded while in tilted position, permitting easy shoveling and much saving in labor.

Invest in a train of Differential Electric Dumping Cars—and watch your construction expenses dwindle.



Write for Bulletin No. D3, and be convinced

**DIFFERENTIAL CAR CO., INC., 141 Broadway, NEW YORK**



## Rico Coasting Recorders

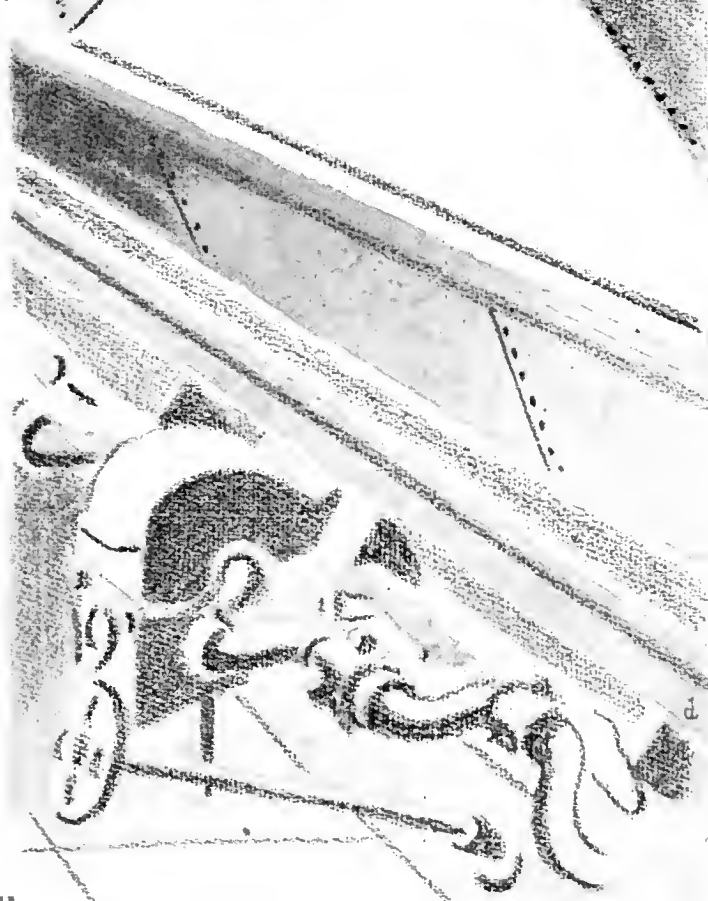
Save Coal at the  
Power Plants

Of the Chicago Elevated Lines, to the extent of 1800 tons in a single month (Dec., 1917, compared with Dec., 1916).

Of the Key Route, California, to the extent of \$1 to \$2 per day per man, or a large part of a ton per car.

Of the New York Municipal Railway to the extent of approximately 1 ton on a *single round trip* of a 5-car train, between Union Square, New York, and Coney Island, a run of 26 miles.

Overhead, underground, on the surface, the Rico Coasting Recorder is a proved guide to the correct use of the power for which fuel is purchased.



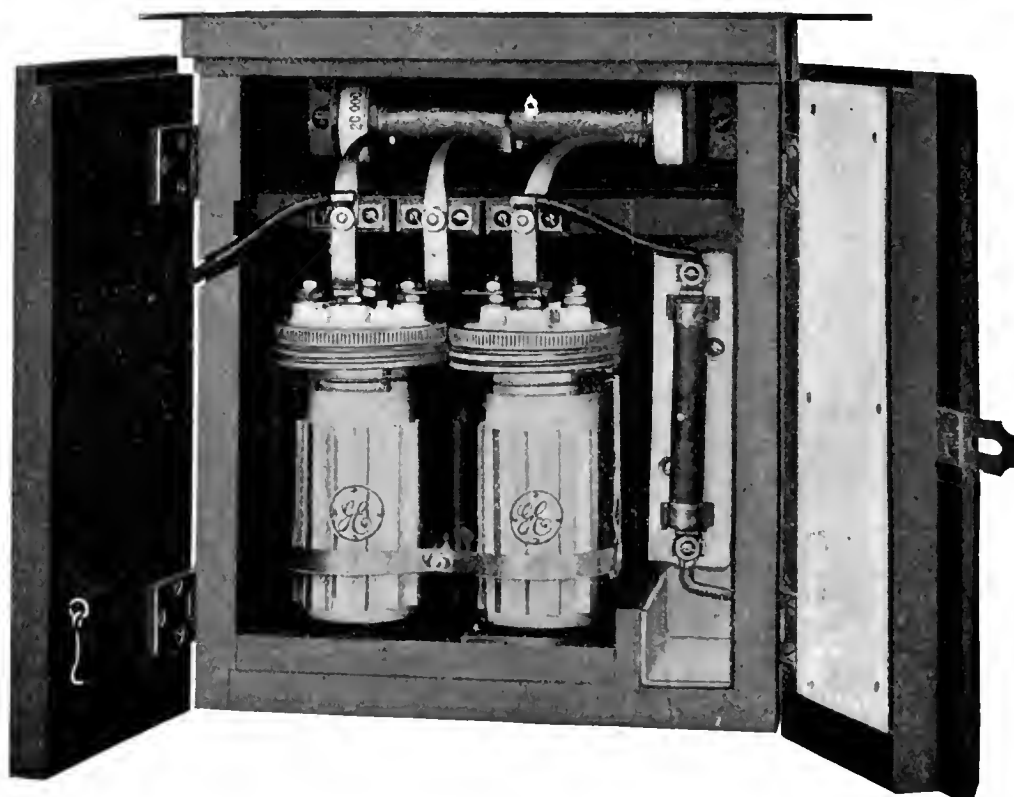
# Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO.



61 BROADWAY, NEW YORK





## Losses From Lightning Are Preventable



## ALUMINUM Lightning ARRESTERS

The G-E Aluminum Arrester for electric railway service has proved for years that it will protect against lightning. It is an electrolytic safety valve and an aluminum condenser in one. It is easy to install and is economical in upkeep.

Roads that have installed these arresters have been practically immune from lightning troubles. They have given better transportation at less cost to themselves.

We have a stock on hand but transportation is uncertain. Order now to get the highest class protection during 1918.

# General Electric Company

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•Southwest General Electric Company  
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# Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 51

New York, Saturday, April 6, 1918

Number 14

## Opening the Discussion on Track Spiral Standardization

THERE is a disconcerting range in the practice of way departments in connection with the use of the transition or easement curve, commonly called the spiral. A similar condition exists in the practice of the several special-work manufacturers. Each railway company and each manufacturer has a standard spiral or system of spirals, with the result that the manufacturer is required to maintain a large stock of costly patterns and templates, and the purchasers of special work must pay the cost not only of their own patterns but also those of many other companies. Truly the way of the spiral seems to have about as many deviations as the paths of the whirling dervishes of the East, and there has heretofore been no common ground upon which to reconcile conflicting views, thus leading to the adoption and use of a uniform or standard system of spirals.

The work of the way committee of the American Electric Railway Engineering Association in standardizing special work specifications has shown that the state of affairs in regard to the adoption of standard spirals is not so difficult but that the seemingly insurmountable obstacles can be overcome. This was indicated by the committee in the proceedings of the Association for 1916, in which it was reported that the adoption of a standard spiral was desirable and that the manufacturers would be glad to accept such a standard provided the railways could agree upon one. Some interest in the subject was also displayed in the American Association question box in August and September, 1916. This gave evidence that the majority of those participating in the discussion believed that a standard system of spirals was both practicable and desirable.

The 1917 committee on way matters took up the matter again, but progress has been delayed through war conditions which have hindered active committee work generally. With the importance of the subject in mind and in order that it may have the wide discussion which is so desirable in matters of this character, the editors have placed the columns of this paper at the disposal of the committee, and in another part of this issue we print an important article by E. M. T. Ryder dealing with a proposed uniform system of spirals. This comprises a report prepared for the way committee.

It is our opinion that there is no reason why a standard system of spirals cannot be evolved to satisfy fully 90 per cent of the controlling conditions throughout the country. The various factors of street widths,

car dimensions, track centers and other details which influence the selection of spirals do not differ so widely but that a system of spirals of reasonable flexibility and range can be made. From this standard component parts can be selected and assembled to meet almost any particular difficulty, such as dodging sewer manholes, water gates and elevated columns. Moreover, a standard system of spirals has been adopted by the American Railway Engineering Association for steamroad use and, although electric railway conditions prevent the use of the same spirals, the action of that association shows what can be done. Incidentally it is suggested that the system of notation used by that association should be used in conjunction with any system of spirals which may be adopted for electric railway use in order to secure uniformity of engineering data.

This is an era in which every possible step should be taken which will result in economical maintenance of tracks, and we believe there is no subject of greater importance to way engineers. We believe further that the adoption of a standard system of spirals by the American Electric Railway Engineering Association will lead to many economies both in first cost and in maintenance of special track work. Mr. Ryder's article represents a great deal of hard work and deserves to be carefully read. We hope that way engineers and managers will give it more than casual study with a view to bringing out profitable discussion and constructive criticism through the columns of this paper.

## Don't Blame It All On the Boss

THERE are two tendencies with which many workers have to contend, both in themselves and in their subordinates—namely, to “knock” the management and to “soldier” on the job. These two faults go together, but our present purpose is to urge the “knockers” either to quit or co-operate. Our belief is that a man with the right spirit can work effectively and happily under any kind of a superior if he believes that superior to be able, well-intentioned and reasonable. With this confidence he can well afford to accommodate himself to the particular plans which are laid out for him, remembering that his first duty is to satisfy the man to whom he directly reports. If he cannot co-operate with his superior through lack of confidence or on account of general “cussedness,” he ought to get out.

The late Fred W. Taylor, who did so much through systemization to improve working conditions in this country and elsewhere, put this whole matter in a nut-

shell. He said that as a worker he early learned that success comes through knowing what one's superior wants done and doing it in his way. He learned this only after some hard knocks, however.

Of course, it is immoral to do anything to please the "boss" if he wants something done that is not right, but granted that he meets the specifications outlined earlier, his wishes should be scrupulously met and every effort should be made to please him with good work. Loyalty, the opposite of "knocking," is essential to progress. Many of the conditions of which the worker is apt to complain are due to his own faults rather than to those of his employer.

### Daylight Saving and Staggered Hour Crowd Out Rush Hour

THE immortal, and always practical, Franklin once calculated how many millions of costly candles were wasted annually through retiring and rising late. In this essay we have a forerunner of the saving-daylight agitation. As a matter of fact, daylight saving simply means that the inside worker is led to do by a doctored clock what the farmer is led to do by the sun, namely, to take maximum advantage of daylight. That, reform being established, we can well consider another.

Staggered Hour is younger brother to Saving Daylight. He, too, deserves to come into his own. His face is not new to the public. In fact, he is exactly as old as Rush Hour, alias Peak Load, who has always been the black sheep of the Time family. We have heard the virtues of the one and the vices of the other discussed by railway men these many years. Rush Hour was in power, and none could displace him. But the war which is to unseat so many tyrants now is after this one. He has been attacked courageously in many quarters, particularly at Rochester. Now comes the Beeler report, abstracted elsewhere in this issue, which threatens his sway in Washington. Should he be defeated there, his deposition in other communities is certain because if he can be driven out of the government department trenches he can be beaten everywhere!

Whether or not the Washington recommendations are adopted in full or in part, the lines of approach and analysis used in their preparation are worthy the consideration of him who wishes to unburden himself of the rush hour in his community. Mr. Beeler did not sit down in his office to evolve a theoretical chart of changes of comings and goings for the people of Washington. His men visited each large group—be it government department, store or office in turn—to determine what the travel actually was regardless of the supposed hours. They made it their business to find out how many people rode, how many walked and why. They determined if the necessary co-ordination of different departments really demanded non-overlapping hours. They did not ignore the fact that there is a relation between the hour of breakfast, the delivery of newspapers, milk and groceries and the prejudices of the domestic servant. They sought the counsel and co-operation of every group concerned, and finally, the consulting engineer did not come forward publicly with the schedule of changes until every objection raised in conference had been answered. Thus was worked out an approximation to the public's ideal of "A seat for

every passenger" and the railway's ideal (so happily phrased by R. W. Perkins, the newly elected president of the New England Street Railway Club) of "A passenger for every seat."

Let us pray that the American people who have been progressive enough to appreciate Saving Daylight will extend the same cordial welcome to Staggered Hour and banish the extravagant, indecent Rush Hour forever!

### The Value of the Report on Stresses in Track to Electric Railway Engineers

IN OUR issue for March 30 we gave a very brief summary report of the progress report of the special committee on stresses in railroad track. The subject of this report is one of the greatest importance not only to steam railroad engineers but also to those who are interested in electric railway tracks, whether on private right-of-way or in paved streets. It is quite well known that railroad track is a structure which has been evolved from previous practice and experience rather than from study and experimental data along scientific lines. It has remained for this committee to earn the enduring regard of the engineering profession through its demonstration that track is subject to known laws and scientific treatment in common with other engineering structures. The proof that track is an elastic structure acting in accordance with Hooke's law is of itself a material contribution to the sum of engineering knowledge.

The committee has yet to report upon the results of its investigations into the action of the tie and on the transmission of pressure through ballast and roadway. When it shall have presented the data on these two details of the subject we may be sure that information of the utmost value will be available for use in extending the study of the subject of proper foundation for tracks in paved streets by the committee on way matters of the American Electric Railway Engineering Association. The latter committee was virtually forced to discontinue its studies on foundation matters for lack of just the sort of information which the committee on track stresses is developing in connection with the action of ties and transmission of pressures through ballast and roadway.

Meanwhile the progress report gives much information of practical value, and one of the important principles is to the effect that rigidity is of first importance as one of the qualities which good track should possess. It must, however, be remembered that the report covers open track conditions, and it will be of interest to note that the rigidity referred to has to do with tracks laid on various forms of ballast such as broken stone, cinders or gravel rather than the rigid form of construction common to tracks in streets where a form of concrete slab is depended upon to give the rigidity and transmit the load to the roadbed. In view of the different set of conditions created by the latter form of construction about which there is a dearth of scientific data as to its action, it seems in order to suggest that the Railway Engineering Association secure the co-operation of the American Railway Engineering Association in an investigation of the stresses in track in paved streets.

## Back Up the Commissions by Persistent Publicity

**P**UBLIC service commissioners are only human, and electric railway companies, making an appeal for increased rates, cannot afford to make the mistake of expecting the commissioners to invite upon themselves torrents of popular—even if misinformed—abuse, if they can avoid it.

Commissions can grant higher fares, but it is no part of their duty to convince the public of the fairness of their decisions—at any rate, beyond such conviction as naturally follows with the few reasonable ones who read such decisions with care.

The task of educating the general public is strictly up to the companies—not because public service commissions, generally, lack moral courage to disregard hostile newspapers, adroit demagogues or unreasonable popular clamor, but because such people do not hesitate to threaten to go to the legislature for political relief and for commissioners' heads.

Without hearing the evidence in the case of the Public Service Corporation, whose appeal for increased fares is now before the commission, the Trenton (N. J.) *Times* has already denounced the appeal as an attempted robbery. And in the issue of Tuesday, March 26, the day the hearing opened, the *Times* brandished the editorial war club, under the significant caption "On Trial," in the following words:

... There may be a demand that the commission be abolished in order that the people may have restored to them rights that appear to be gradually slipping away. The near future will probably enable them to decide whether they desire to retain the board.

In Oregon the decision by the Public Service Commission that the Portland Railway, Light & Power Company should be allowed to charge a 6-cent fare, has resulted in the introduction by the trolley car baiters of an "initiative" bill, to repeal the act establishing the commission. It comes to a vote next November.

The first thing to be accepted is the fact that you are talking to a hostile audience, if not a "packed jury." The educative process can never be speedy. The inertia of human conviction is too great. The company that waits until it wants something, before it speaks to the public, is suspected right from the start. Every argument is received coldly and with incredulity.

Electric railway men themselves were pretty slow in learning their own business. For example, it took them years to learn that depreciation must be provided for from current earnings. They cannot expect the public to learn even the basic facts of as complicated a thing as the electric railway business and to understand the true relationship between public and public utility in a minute, or a week, or a month. But until the public has that understanding and sympathetic attitude, it is perfectly hopeless to expect anything but opposition to fare increases.

And the issue is of an importance that cannot be overestimated. The *Saturday Evening Post* well says in its issue of March 31:

If the American experiment of private ownership and public regulation fails, because regulating bodies have not the courage to face criticism, or because they are animated by hostility to capital, the only alternative is government ownership—to the great satisfaction of Tammany Hall and every like organization.

The experiment will fail unless, on the whole, regulating bodies discover a more courageous and liberal temper.

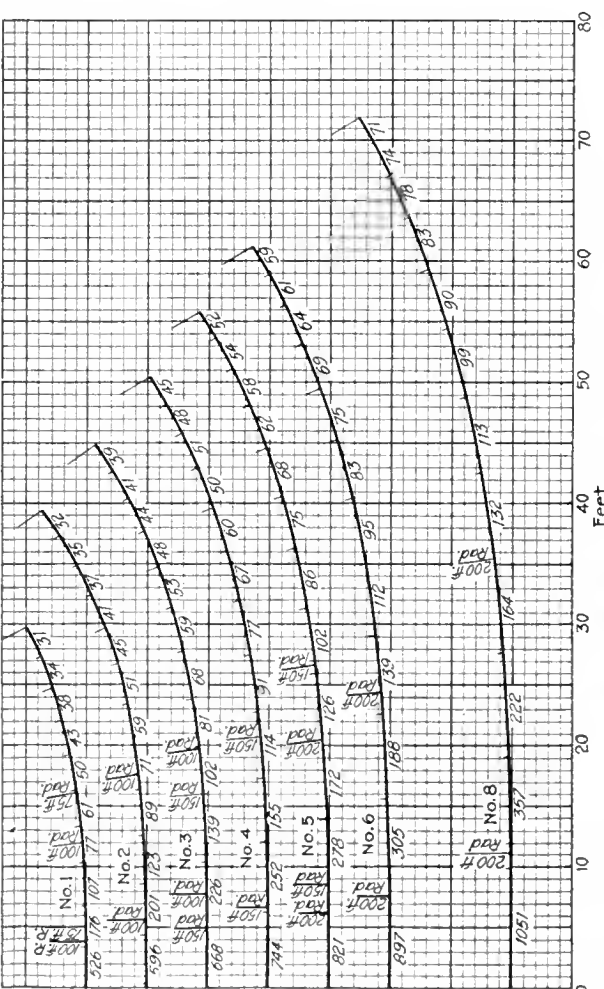
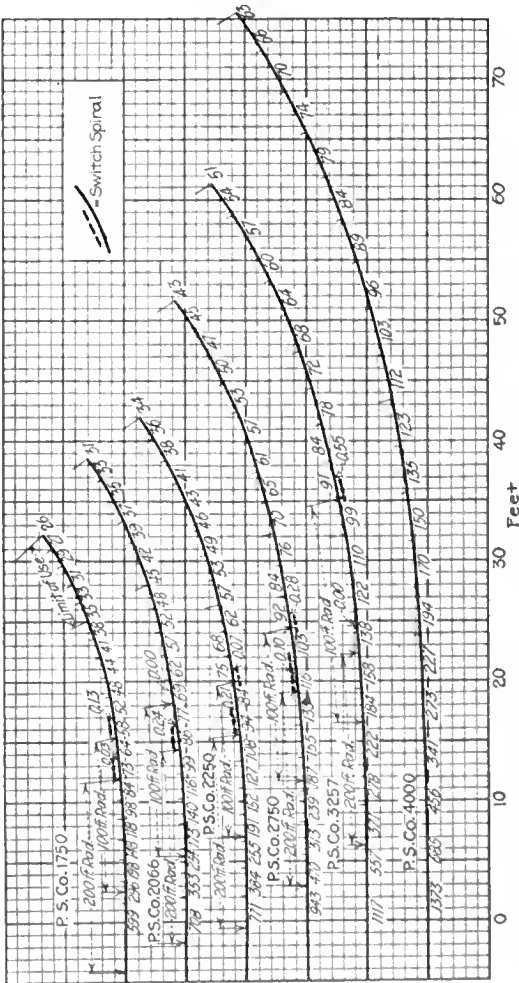
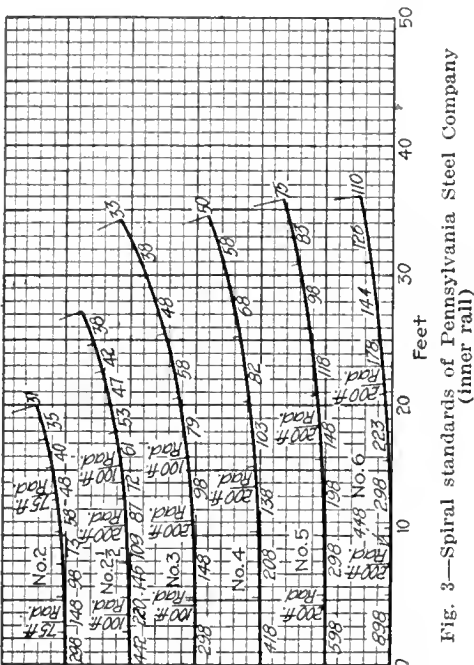
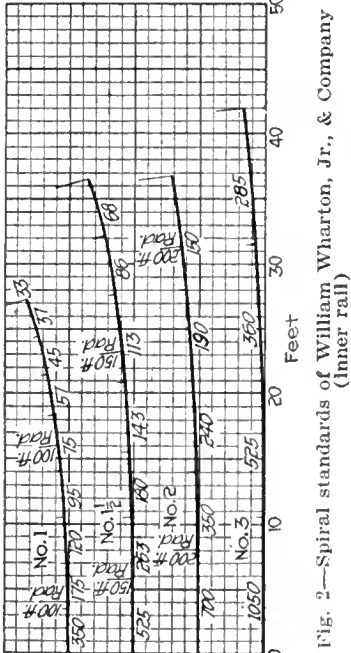
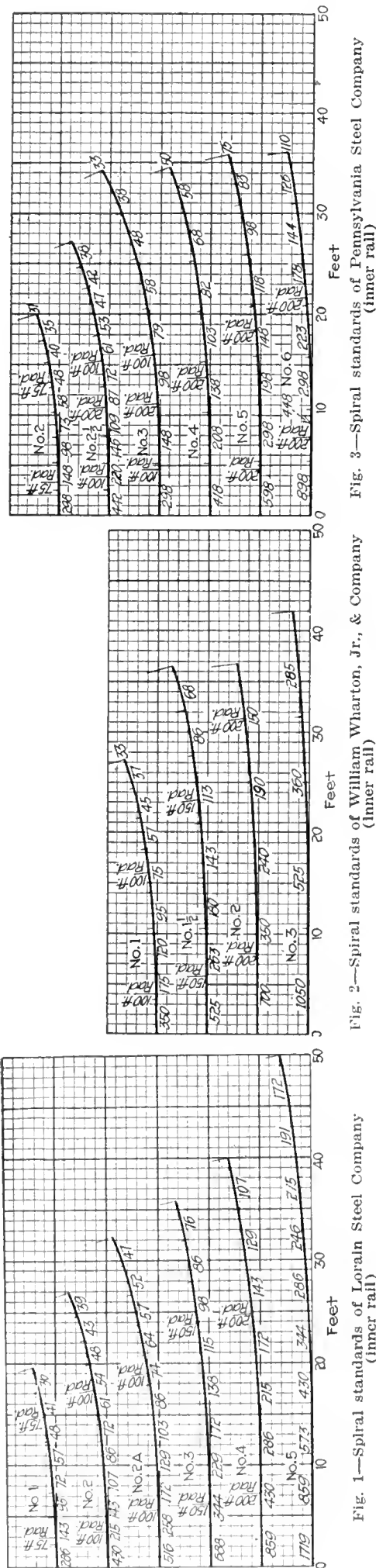
And the publicity necessary to show the general public, upon whose will the public service commissions themselves exist, the true facts and their true interest cannot come from the commissions. It must come from the companies.

## Co-ordinated Control for Any Properties Needed by Government

**U**NDER the act passed in August, 1916, the President has power to take over electric railways if he thinks such action necessary to the prosecution of the war. He is also empowered, under Senate bill No. 3388, introduced by Senator Fletcher, to take over any street or electric interurban railway which is considered by the government essential to the transportation of employees of shipyards or other work connected with the present ship construction policy of the government. While we believe that the electric railway companies of the country are not desirous of having their properties taken over by the government, they are prepared to accept such action if, in the opinion of the President, conditions arise which would make the control by the government of these properties either desirable or necessary. Railway men feel that if the electric railway facilities of this country are necessary to the winning of the war and can be put to more effective service by passing under the control of the government, they are ready to accept that condition.

A bill is now before Congress, however, which provides for quite a different arrangement and one out of accord with the better general plan of the co-ordination of our transportation resources. This bill was introduced in the House on Feb. 26 by Mr. Clark of Florida and was reported out on Feb. 28 from the committee on public buildings and grounds. Its main object is to provide for the housing of industrial workers who are engaged in industries connected with or essential to the national defense during the continuation of the war and as much authorizes the Secretary of Labor to acquire lands and build houses as he may determine necessary for such purpose. But coupled with this the bill gives to the Secretary of Labor the power to acquire by purchase or otherwise such local transportation and other community facilities or parts thereof as in his judgment may become necessary for the proper execution of the trust thus created.

The purpose of the bill, that of providing proper facilities for the housing of war workers, is commendable, but we think that it would be unfortunate if the authority for taking over urban and interurban trolley lines should be vested in various heads of departments according to their judgment. It would not only place the industry in a constant position of uncertainty, but it would lead or might lead to a great deal of confusion in case one department sought to take over a line for its use while the line might be serving a more important governmental function in the handling of troops, supplies, mail, etc., either as a local movement or in connection with through traffic. Again, it would result in different railways, possibly even different parts of the same railway, being administered under entirely different policies and methods. Centralized responsibility and direction, such as would follow the assumption of this control by the President or the Director of Railroads, would be much better.



# Present and Proposed Track Spirals of Several Manufacturers

(Each small space equals 1 ft. square)



# Greater Uniformity in Track Spirals Will Conduce to Economy

The Author Shows that Co-operation Among  
Manufacturers and Users Could Bring About Great  
Simplification in This Element of Special Work

BY E. M. T. RYDER

Engineer Maintenance of Way Third Avenue Railway, New York City

THE following article comprises a report by the author to the committee on way matters of the American Electric Railway Engineering Association. It is desirable to obtain all possible discussion on this most important subject, and as the war has caused a temporary cessation of committee activity in the association, it was thought advisable to give the article desirable publicity through the columns of this paper.

At the January, 1917, meeting of the way committee the writer submitted two drawings on the subject of uniform track spirals, blue-prints of which were furnished to each member of the committee. Drawing No. 1 showed a set of five spirals which were suggested as a possible basis for spiral standards to be adopted by the association. Drawing No. 2 showed the existing spirals of the Lorain, Wharton and Bethlehem companies. Since this meeting criticisms of the proposed spirals have been received from five members of the committee and from one former member. In four of the six cases blue-prints were submitted showing the spirals in use by the critic, with an argument to show their superiority over those suggested by the writer. It would have been interesting to know whether the other members were similarly minded and, if so, why they hid their light under a bushel.

Incidentally it may be noted that of the four schemes suggested one calls for a single spiral, one for twenty-two spirals, one for no spiral at all, but suggests using two simple sets of compound curves, and one for a special, long-radius approach curve, the data at hand being incomplete as to the corresponding switch curves.

## DESIRABILITY OF STANDARDS

This marked difference in practice is in itself one of many good arguments for the necessity of having standards—and the difficulty of getting them. All way engineers, of course, know that the largest three manufacturers of special work use entirely different sets of spirals. It may not be so well known that some years ago they attempted to "bury the hatchet" and agree on new standards, but no common ground was found at that time. The present time is, for several reasons, a good one in which to attempt to establish standards for the entire trade. Practically none of the existing spirals is long enough to accommodate the A.E.R.E.A. standard switch pieces. Also, present business conditions are likely to result in curtailment of orders for special work, and therefore policies of co-operation, economy and efficiency are everywhere the order of the day.

The writer has been interested in working up the

proposed uniform spirals in a little more detail and in comparing them with the standards of the various steel companies and of the railway companies whose engineers kindly furnished data of their own. Thirteen drawings are reproduced herewith, showing this information. The positions of cut-in points for switches have not been figured out for the proposed uniform spirals and, therefore, cannot be definitely assumed where shown. All comparisons shown on the accompanying drawings are based on curves for inside rail.

## PROPOSED SPIRALS BASED ON STEAM RAILROAD STANDARDS

The proposed uniform spirals are based on Searle's spirals, commonly used by steam railroads, the fundamental principle of which is that the rate of curvature increases uniformly by a fixed amount per chord from zero to the curvature of the circular part of the curve. In steam railroad work the number of chords is generally kept constant and the length of the chord varied. In these proposed spirals the chord length is held uniformly at 5 ft. and the rate of curvature per chord is varied. Each spiral may be used with curves of various center radii by dropping off the appropriate number of chords from the sharp end of the spiral.

The proposed spirals can be laid out on the ground by transit if desired, the deflection angles to all points being given in the data in the accompanying table. This is chiefly of value in locating new lines, as correct stationing can be carried around all curves, thus preserving profile distances, etc.

The data for inside and outside rails have not been calculated, but they can be worked up later should the proposed spirals be considered worthy of further study. Co-ordinates for the center line are given in the table for convenience in plotting for comparison with other spirals. These figures were obtained by scaling from layouts plotted on a scale of 1 in. = 1 ft. by deflection angles and chords. The precise radii of these spirals can probably be modified slightly to advantage, as stated below, but the writer believes that the general scheme submitted deserves careful consideration both as to the fundamental basis of the individual spirals and their group relationship.

All the spirals are suitable for easements for plain curves and their number and relative proportions allow considerable variation to suit local conditions. In all cases circular arcs of the standard switch radii shown can be cut in without any change in the spiral and of sufficient length to take switch pieces of A. E. R. E. A. standard length.

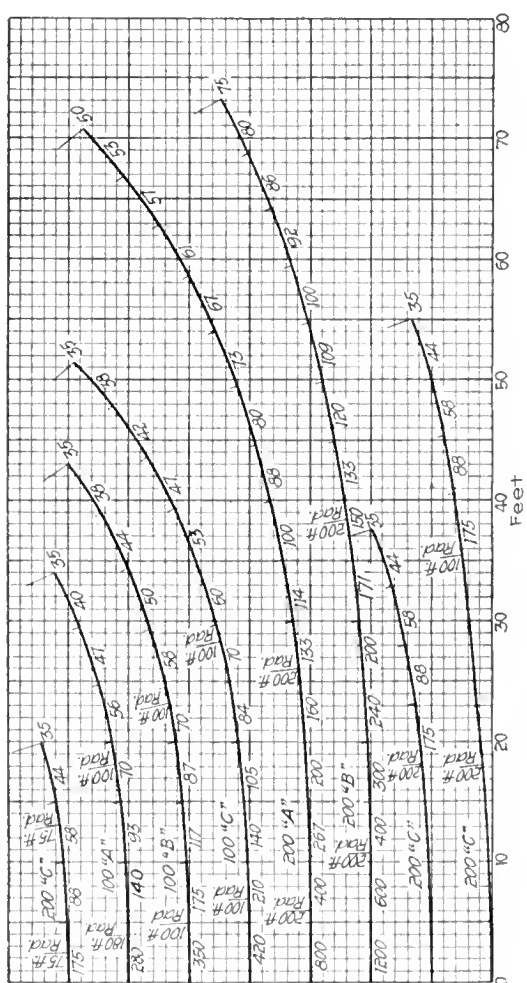


Fig. 6—Proposed uniform standard spirals (plotted for center line. For data see table)

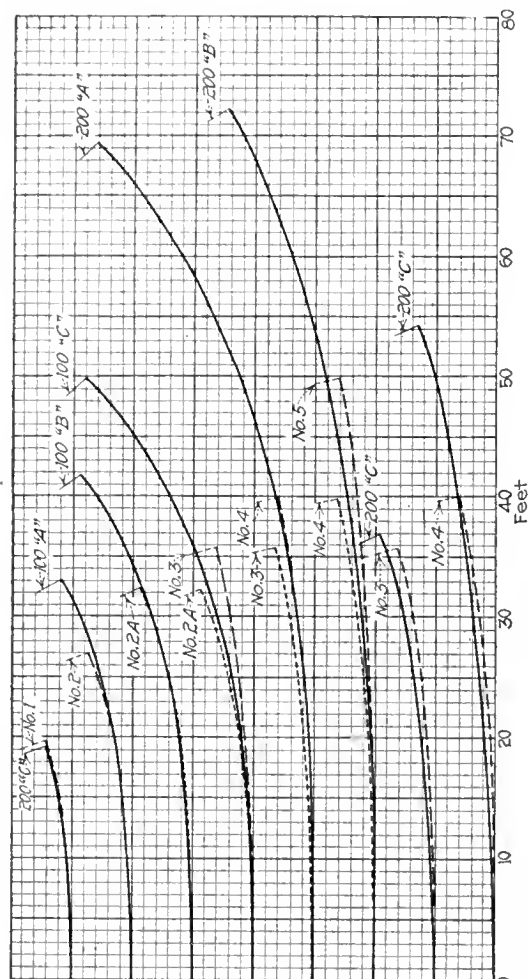
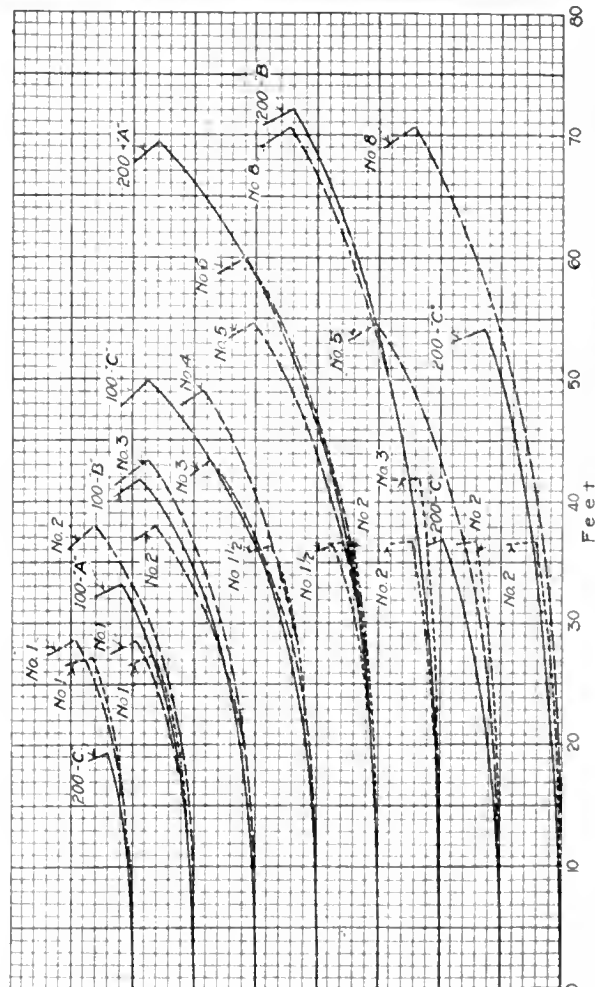


Fig. 7.—Comparison of Lorain Steel Company's spirals with proposed uniform spirals (in-  
ner rail). Solid line 200-B inclusive; dash line No. 1 to No. 5 inclusive; dotted  
line as above and No. 2-A.



F. g. 8—Comparison of William Wharton, Jr., & Company's spirals with proposed uniform spirals (inner rail). Solid line 200-C to 200-C inclusive; dash line No. 1 to No. 8 inclusive.

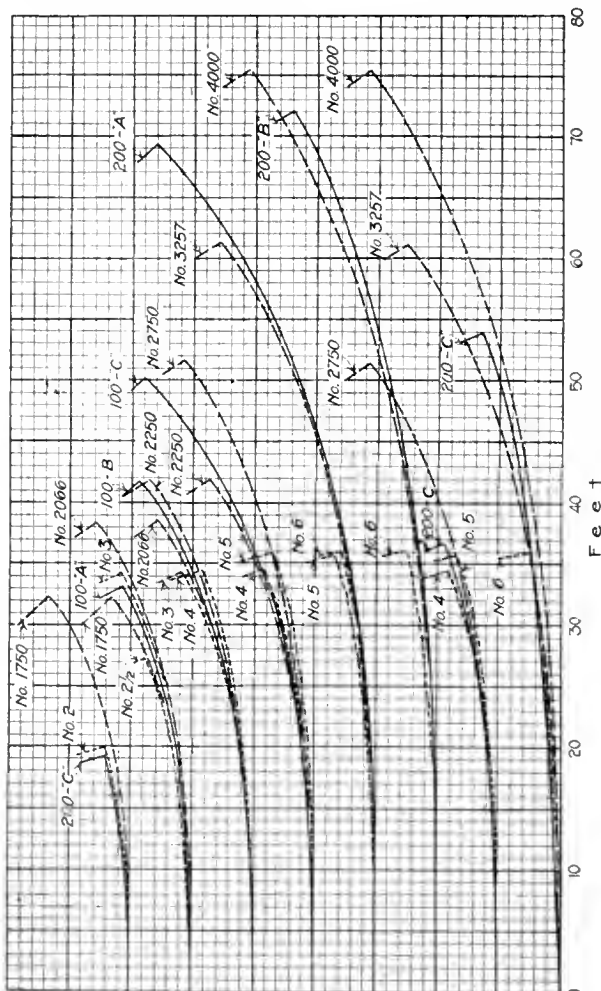


Fig. 9—Comparison of Pennsylvania Steel Company's spirals with proposed (inner rail). Solid line 200-C to 200-C inclusive; dash line No. 1750 to No. 4000 inclusive; dotted line No. 2 to No. 6 inclusive.

# Proposed A. E. R. E. A. Standard Spirals and Comparisons with Present Manufacturers' Standards

(Each small space equals 1 ft. square)

The proposed standards provide three spirals into which 100-ft. switches can be cut, two into which 200-ft. switches can be cut, and one spiral which can be used as an easement for a clearance curve for 200-ft. switches or as a short spiral into which a 75-ft. switch can be cut.

Spiral 100-A is intended to be the shortest spiral of the given type which will allow the cutting-in of a standard A. E. R. E. A. 100-ft. radius switch. As shown, it is a little longer than absolutely necessary and the radii can be figured down accordingly if desired. Spiral 100-B is of 25 per cent greater radius and spiral 100-C

ENGINEERING DATA FOR PROPOSED UNIFORM SPIRALS

SPIRAL 200 "C"							SPIRAL 100 "A"						
N=4. L=20. R=35. D=4° 6'. Co-ordinates.							N=7. L=35. R=35. D=4° 6'. Co-ordinates.						
P	R	Dp	Cp	Lp	X	Y	P	R	Dp	Cp	Lp	X	Y
0		0° 00'	0° 00'	0	0.0	0.00	0		0° 00'	0° 00'	0	0.0	0.0
1	175	0° 49'	1° 38'	5	0.1	5.00	1	280	0° 31'	1° 02'	5	0.1	5.0
2	88	2° 03'	4° 55'	10	0.4	10.0	2	140	1° 17'	3° 05'	10	0.2	10.0
3	58	3° 50'	9° 50'	15	1.0	14.9	3	93	2° 24'	6° 09'	15	0.6	15.0
4	44	6° 09'	16° 24'	20	2.2	19.8	4	70	3° 51'	10° 15'	20	1.3	19.9
	35						5	56	5° 38'	15° 23'	25	2.4	24.8
							6	47	7° 46'	21° 32'	30	4.0	29.6
							7	40	10° 15'	28° 42'	35	6.2	34.1
								35					

SPIRAL 100 "B"							SPIRAL 100 "C"						
N=9. L=45. R=35. D=4° 6'. Co-ordinates.							N=11. L=55. R=35. D=4° 6'. Co-ordinates.						
P	R	Dp	Cp	Lp	X	Y	P	R	Dp	Cp	Lp	X	Y
0		0° 00'	0° 00'	0	0.0	0.0	0		0° 00'	0° 00'	0	0.0	0.0
1	350	0° 25'	0° 49'	5	0.1	5.0	1	420	0° 20'	0° 41'	5	0.0	5.0
2	175	1° 02'	2° 28'	10	0.2	10.0	2	210	0° 51'	2° 03'	10	0.1	10.0
3	117	1° 55'	4° 55'	15	0.5	15.0	3	140	1° 36'	4° 08'	15	0.4	15.0
4	87	3° 05'	8° 12'	20	1.1	20.0	4	105	2° 34'	6° 50'	20	0.9	20.0
5	70	4° 31'	12° 18'	25	2.0	24.9	5	84	3° 46'	10° 15'	25	1.6	24.9
6	58	6° 13'	17° 13'	30	3.3	29.8	6	70	5° 11'	14° 21'	30	2.7	29.8
7	50	8° 12'	22° 58'	35	5.0	34.4	7	60	6° 50'	19° 08'	35	4.2	34.6
8	44	10° 27'	28° 31'	40	7.2	38.9	8	53	8° 43'	24° 36'	40	6.1	39.3
9	35	12° 59'	36° 54'	45	9.9	43.2	9	47	10° 49'	30° 45'	45	8.4	43.7
							10	42	13° 09'	37° 35'	50	11.2	47.8
							11	38	15° 43'	45° 06'	55	14.5	51.5
								35					

SPIRAL 200 "A"							SPIRAL 200 "B"						
N=15. L=75. R=50. D=2° 52'. Co-ordinates.							N=15. L=75. R=75. D=1° 53'. Co-ordinates.						
P	R	Dp	Cp	Lp	X	Y	P	R	Dp	Cp	Lp	X	Y
0		0° 00'	0° 00'	0	0.0	0.0	0		0° 00'	0° 00'	0	0.0	0.0
1	800	0° 11'	0° 22'	5	0.0	5.0	1	1200	0° 14'	0° 14'	5	0.0	5.0
2	400	0° 27'	1° 05'	10	0.1	10.0	2	600	0° 28'	0° 42'	10	0.1	10.0
3	267	0° 50'	2° 09'	15	0.2	15.0	3	400	0° 42'	1° 25'	15	0.2	15.0
4	200	1° 20'	3° 35'	20	0.4	20.0	4	300	0° 57'	2° 21'	20	0.3	20.0
5	160	1° 58'	5° 23'	25	0.8	25.0	5	240	1° 11'	3° 32'	25	0.6	25.0
6	133	2° 43'	7° 31'	30	1.4	30.0	6	200	1° 25'	4° 57'	30	1.0	30.0
7	114	3° 35'	10° 02'	35	2.2	34.9	7	171	1° 39'	6° 36'	35	1.5	35.0
8	100	4° 34'	12° 54'	40	3.2	39.8	8	150	1° 53'	8° 29'	40	2.2	39.9
9	88	5° 40'	16° 08'	45	4.5	44.7	9	133	2° 07'	10° 36'	45	3.0	44.9
10	80	6° 54'	19° 43'	50	6.0	49.5	10	120	2° 21'	12° 57'	50	4.0	49.8
11	73	8° 15'	23° 39'	55	7.8	54.1	11	109	2° 35'	15° 32'	55	5.2	54.6
12	67	9° 43'	27° 57'	60	10.0	58.7	12	100	2° 50'	18° 22'	60	6.6	59.4
13	61	11° 18'	32° 37'	65	12.5	63.0	13	92	3° 04'	21° 25'	65	8.3	64.1
14	57	13° 00'	37° 38'	70	15.4	67.0	14	86	3° 18'	24° 43'	70	10.2	68.7
15	53	14° 49'	43° 00'	75	18.7	70.8	15	80	3° 32'	28° 15'	75	12.4	73.2
	50							75					

PROPOSED UNIFORM SPIRALS  
Spirals are similar to "Scarcas Spirals." Rate of increase of curvature per chord is constant and equals deflection angle for first chord.  
All chords 5 ft. long on Center Line of track (as plotted).  
Dc=Deflection angle for circular part of curve.  
Dp=Deflection angle to any point on spiral.  
Cp=Central angle to any point on spiral.  
S=Central angle, total for spiral.  
R=Radius circular part of curve in feet.  
N=Number of chords in spiral.  
L=Length of spiral=5 N feet.  
P=Number giving position of chord on spiral.  
 $Dp = \frac{a}{b} Dc$ . Where  $a = 2P^2 + 3P + 1$ .  
And  $b = 6(N+1)$ .  
Central angles of chords of spirals form series  $\frac{2 Dc}{N+1} (1+2+3+\dots+N)$ . Sum  $S = N Dc$ .  
Radii of arcs of spiral form, approx. series (assuming angles proportionate to sine)  
 $(N+1)R (1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\dots+\frac{1}{N})$

is of 50 per cent greater radius. The latter two can be used when local conditions permit or require. All designers who have tried to make special work layouts dodging sewer heads, water-gates and elevated columns, etc., know that a certain amount of flexibility is necessary if the engineers are to avoid insanity.

Spiral 200-A is intended to be the shortest spiral of the given type which will allow the cutting-in of a standard A. E. R. E. A. 200-ft. radius switch. This spiral, like 100-A, is a little longer than absolutely necessary, and the radii can be figured down in the same manner. Spiral 200-B is of 50 per cent greater radius. Spiral 200-C is intended to be used in combination with a 200-ft. radius plain branch-off curve of the necessary

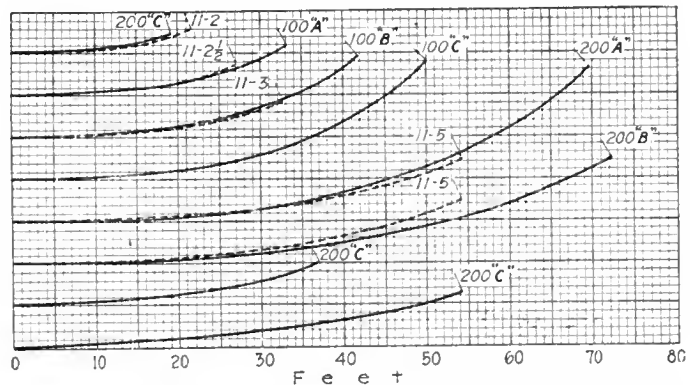


Fig. 10—Comparison of Cleveland Frog & Crossing Company's spirals with proposed uniform spirals (inner rail). Solid line 200-C to 200-B inclusive; dotted line 11-2 to 11-5 inclusive.

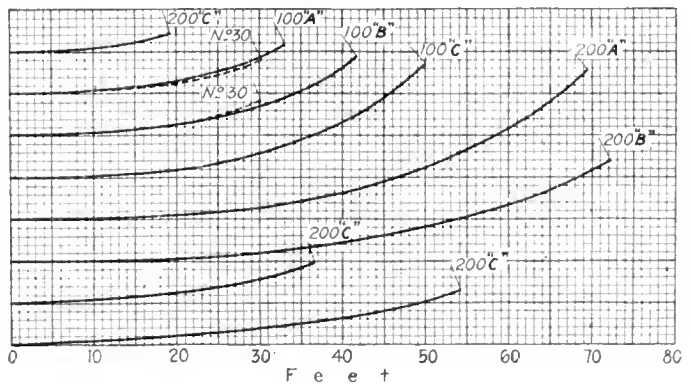


Fig. 11—Comparison of Montreal Tramways spirals with proposed uniform spirals (inner rail). Solid line 200-C to 200-B inclusive.

COMPARISONS OF PROPOSED STANDARDS WITH STANDARDS OF ONE MANUFACTURER AND ONE RAILWAY COMPANY  
(Each small space equals 1 ft. square)

length to allow for the A. E. R. E. A. standard switch before reaching the spiral.

To obtain car clearance it will generally be necessary to cut in a piece of long-radius plain curve between the switch and the spiral. As meeting ordinary conditions of distance between track and car dimensions, the writer suggests using 1 deg. of 1000-ft. radius as a standard. The chief use for the 200-ft. radius switch is in the inside curve of a double track branch-off where the above type of layout is generally essential in order to get car clearance. True spirals like 200-A and 200-B can be used for single-track branch-offs in wide streets or in acute-angle layouts.

Spiral 200-C can also be used in places where there is no room for standard 100-ft. switches, for 75-ft. switches must be used sometimes if we are to get out of the trenches.





## Martial Note Dominates Banquet

Work of Electric Railway War Board and Other War Activities Described at Annual Meeting of New England Street Railway Club

**L**OYALTY to the cause of liberty, support of our allies, and a determination to see the war through to a victorious conclusion were voiced by the speakers and by 562 members and guests of the New England Street Railway Club at the eighteenth annual banquet of the organization in Boston on March 28. Appropriately in view of the war conditions the banquet was the most informal in the history of the club, the decorations being confined to the display of the national colors of the United States, Great Britain and France behind the speakers' dais. Patriotic themes were discussed by A. H. Ford of Portland, Me., retiring president of the club; R. W. Perkins of Norwich, Conn., president-elect; Hon. Guy A. Ham, Boston, Mass., toastmaster; Hon. John W. Weeks, United States Senator from Massachusetts; Hon. Andrew J. Peters, Mayor of Boston; Lucius S. Storrs, New Haven, Conn., of the Electric Railway War Board; and Major Guy C. Boyer, Twenty-second Battalion, Canadian Expeditionary Forces, who was received with tremendous enthusiasm.

### PROBLEMS OF THE INDUSTRY AND WORK OF ELECTRIC RAILWAY WAR BOARD

Mr. Storrs pointed out that never in their history have electric railways been confronted with such acute conditions as at present. Rising costs have practically wiped out surplus. Some lines have been abandoned, others forced into receivership; others are tottering on the verge. Nearly all properties are nearly bankrupt. This condition is not confined to any local territory, but is nation-wide, and for that reason all the more readily understood.

The public as well as the public utility commissions are realizing the extreme needs and the publicity that has been given to the exchange of letters between President Wilson and Secretary McAdoo is having wide effect. The public has been taken into the confidence of the electric railways, and the slogan now is "Allow us to earn a fair return upon the value of the property which we have been invited to maintain for the public convenience," not that the industry may make large profits but in order that it may be an efficient agency in the successful conduct of the war. A hearing on the matter of increased rates is now orderly investigation and not the inquisition of former days. It is helpful to the community, to the commission and to the corporation.

"We are too apt to think of our problem," said Mr. Storrs, "our property and the public each of us serves in terms of local interest. Of course, we would not be worth-while employees if we did not have the interest of our particular corporation at heart, but we must realize that the little local problem with which we happen to be confronted is but one unit of the big problem, for the plight in which we each find ourselves is national in its scope. The average person never stops to think that if the services of the public utilities should stop throughout the country the whole war program would immediately collapse. It follows that in so far

as the efficiency of the public utilities is impaired, the war program is proportionately delayed.

"The conditions with which this industry is confronted have gravely affected the efficiency of all, and collapse has been imminent. It was the full realization of this that led President Wilson to say, 'It is essential that these utilities should be maintained at their maximum efficiency and that everything reasonably possible should be done with that end in view.' Briefly there is an investment of \$11,350,000,000 in the public utility business, with gross earnings of \$1,500,000,000 a year and a coal consumption of 51,500,000 tons annually. There are maturing obligations during 1918 of \$232,000,000 and during 1919 of \$265,000,000. It is estimated that the 1918 earnings will increase by \$228,000,000. Operating costs will increase \$290,000,000, resulting in an income decrease of \$62,000,000, coupled with which there is the need for an estimated increase in investment to meet the actual requirements of these times of \$650,000,000. Certainly this is a dangerous condition and one requiring immediate relief from all sources."

Mr. Storrs then described the organization of the Electric Railway War Board, with offices in Washington.

When the War Board began its work the problem seemed to be largely one of affording the various companies relief from some of the annoying restrictions placed upon certain branches of their work and of aiding in the delivery of materials, fuel and supplies. While fuel distribution will now be decentralized, there still remains the problem of obtaining shipments from contractors and this can only be handled through the National Fuel organization. The War Board has been successful in straightening out conflicting rulings of various collectors of the Internal Revenue Department. The board's traffic department is also doing what it can to co-operate with the Ordnance Department of the Army and other branches of the military and naval service to render electric railway transportation available.

### SOME WAR BOARD ACCOMPLISHMENTS

There have been appearances before committees in an effort to have the war finance corporation bill so framed as to enable the industry to obtain assistance in financial matters. The board has secured the elimination of the electric railways from these so-called "short-line" provisions of the railroad bill. An effort has been made to amend the bill now pending which would give the Secretary of Labor power to take over electric lines. Misstatements regarding electric railways made before Congressional committees which would work to the detriment of the industry have been corrected. A large amount of work is on hand at present. Public opinion has changed and there is a greater realization of the co-partnership existing between the utility and the community than ever before. Maximum efficiency on the part of the War Board and of the recently organized conference committee of all the public utilities requires the active co-operation of each of the individuals in the industry with full interchange of suggestions and action thereon so far as feasible in the interest of the public welfare and the companies.



## New Zones Authorized

### Maine Public Utilities Commission Grants New Rate Schedule to Lewiston, Augusta & Waterville Street Railway

THE Lewiston, Augusta & Waterville Street Railway, Lewiston, Maine, on March 1 put into effect a new rate schedule between Lewiston and Bath, in accordance with a recent decision of the Public Utilities Commission. This schedule supersedes that filed on July 1, 1917, but grants the same total fare of 50 cents for the entire distance of 28.28 miles. There are, however, some features of the decision which are of special interest.

The fare was originally  $1\frac{1}{4}$  cents per mile for through travel, and much less than 1 cent per mile for some of the zones. This fare had been in effect since the line was built in 1898, with the same number of zones and only minor changes in their limits. The revised schedule was filed by the company because the old zones were not properly arranged, some being much longer than others without adequate reason.

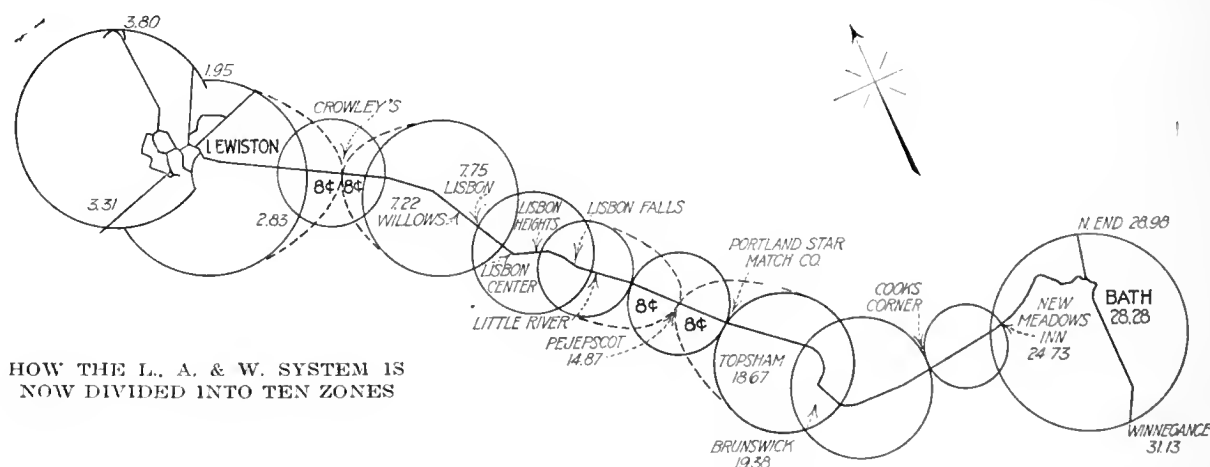
In commenting on the situation the commission said:

"The zone system of fixing electric railway fares is, at best, a compromise, and not absolutely equal in its

those now charged persons going to and from Pejepscot, in either direction. While we find, and we do not understand that complainants seriously deny, that the proposed increase of fare from 35 to 50 cents is not more than just, we are satisfied that situations exist in both of these communities which demand special attention.

"Overlaps are confusing and should be avoided when possible, but so long as the zone system of fares is adhered to they will have to be tolerated where there is an otherwise irreconcilable clash between a reasonably exact division of distances and local conditions. We shall resort to this practice to remedy what otherwise would be an injustice to the travel between Lisbon Falls and Lisbon Village, and to remove minor hardships created by the new schedule at Lisbon Heights and at New Meadows Boat Landing."

Under the plan finally approved, shown in the accompanying diagram, ten 5-cent zones, some of which overlap, are required for the entire distance, the length of these zones varying from 2.45 to 3.70 miles. They provide an average rate of 1.765 cents per mile. To meet the special local conditions at Crowley's Junction, a suburban point near Lewiston, and at Pejepscot where a large pulp mill is located, special 3-cent zones



results. Some persons must live just over the line, wherever it falls, and pay an extra fare for a short ride. Since this cannot be avoided, it is a strong argument for making the base fare as low as practicable, and is one of the considerations which has deterred us from retaining the original number of zones and making a corresponding increase per zone.

"There is now a tendency among electric railways toward the adoption of the copper zone system, which is practically a mileage rate, starting with a reasonably long zone at the usual base rate, and adding 2 cents, or whatever the rate may be, for each mile, or fraction thereof, in addition. Even this is only another step in reducing the base fare; it still recognizes the zone principle. It is preferable in theory, but we are not convinced that it is now practicable to apply this practice anywhere on respondent's system until it can be worked out for the entire system, and one of the attorneys for the complainants frankly so admitted, although he at first asked for it.

"The principal complaints were directed at the rates in what formerly constituted the Lewiston zone and

are created. The extended zones, one of which is on each side of each of the above points, cover the 5-cent zone on which they are based but extend to the center of the next adjoining 5-cent zone, where they meet. This arrangement gives these two points, Crowley's Junction and Pejepscot, the advantage of a single 8-cent zone, in either direction.

### Cars with Small Wheels for Cleveland

SEVERAL of the twenty-five all-steel cars ordered a year ago from the Cincinnati Car Company by the Cleveland (Ohio) Railway are now in operation. The new cars are of the Peter Witt type but differ from the original ones of this type in being mounted on smaller wheels and having motors of but 25 hp. instead of 40 hp. These cars weigh 32,000 lb. each, or 12,000 lb. less than the combination steel and wood cars. In these cars the roof is of steel with white enamel interior finish, and the seats are covered with leatherette. The floor is slightly ramped. A street sign is placed above the front vestibule and a side roof sign above the center exit.

# Staggered Hours for 88,000 Washington Employees

**Present Tremendous Crush in Capital City Due to General 9 O'Clock Opening Hour—  
John A. Beeler Proposes New Hours for 45,000 Employees—All Business  
Interests and Car Riders Will Be Benefited**

**T**HE latest report of John A. Beeler on the electric railway situation in Washington, D. C., submitted to the Public Utilities Commission on March 22, covers the subject of staggered hours for business. Mr. Beeler finds that with the continuance of the present hours the electric railway service will continue to suffer more or less from congestion, delays and overcrowding, especially during the morning rush hour. With the hours changed as he proposes, however, the service can be materially improved at once, and a foundation will be established upon which can be operated ultimately a system of urban transportation worthy of the capital city of America.

Washington is in no sense a usual city. Primarily it is governmental in character. On Jan. 1, 1918, the total number of government employees was close to 70,000; it has since increased by several thousands. The city is not a manufacturing center. Apart from the Washington Steel & Ordnance Company, located in the extreme southern corner of the District of Columbia, the few small factories are a negligible quantity as far as the transportation problem is concerned. The commercial enterprises which care for the local needs of the population, including department stores, offices and retail business of various sorts, while ample, are completely overshadowed by the great governmental activities.

The population in the older sections, as compared with the suburbs, is distributed in a remarkably even way. The result is that most of the people walk to and from their work, and many prefer to live within easy walking distance of their places of employment. At present others do so because of the electric railway congestion. Where the population extends farthest out, the greatest car congestion prevails. With the rapid and extensive growth brought about by the war, more people are forced to live in the outlying territory, thus accentuating the problem.

The primary cause of Washington's congested traffic situation, Mr. Beeler states, is the present hours of work, particularly the opening hour at 9 a.m., which is almost universally observed by the government, the private offices, schools and the big stores. The federal government years ago fixed the opening of most of the

departments at this hour, and on account of the climatic conditions and the generally confining nature of the work created an apparently short day by establishing 4 p.m. as the closing hour. Private offices generally open at 9 a.m. and close between 5 and 5.30 p.m. The latter, however, usually allow an hour or more for lunch, while the government departments allow but thirty minutes. The schools also open at 9 a.m., but close earlier than the departments. The large stores open at 9 a.m. and close from 5.30 to 6 p.m.

Within the last few months, in an effort to alleviate existing conditions, the Departments of Commerce and the Interior have changed their opening hours from 9 a.m. to 8.30 and 8.45 a.m. While this has aided to a certain degree, the number of employees involved is insufficient to make any great change in the general situation.

The three industrial offices, the Bureau of Engraving, the Government Printing Office and the Navy Yard, for years have had hours from 8 a.m. to 4 p.m. Recently it has been found necessary to put on additional help in two shifts—the first from 4 p.m. to midnight, and the second from midnight to 8 a.m.

Washington as a whole, Mr. Beeler says, goes to work promptly at 9 a.m. The result is that there is a tremendous demand for transportation to land the people at their places of business at this time. Counts of pedestrians were made at eight points far enough from the business section to secure those going to and from their work. The observations were made in January, when the weather was not particularly favorable for walking, so that few were doing it for pleasure.

The result of combining the counts of incoming pedestrians in the morning is shown in Fig. 1. This shows that the maximum peak was reached at 8.37 a.m., which would on an average permit the walkers to reach the downtown section at or before 9 a.m. This clearly indicates that the walkers' peak downtown is at this hour.

The results in the afternoon, on the other hand, do not indicate any marked peak. The government offices close fairly early. Many employees prefer to shop before going home, while others proceed homeward immediately. The transients especially remain down-

## They Cannot All Be Carried at Once

When it is remembered that the function of an electric railway system is to provide regularity and continuity of service at all reasonable hours for the regular and normal as well as the abnormal movements, for those outbound as well as those inbound, for the occasional rider, the stranger, and the entire community generally, the magnitude of the task of attempting to bring a large proportion of the population down town for a universal 9 a.m. opening hour is apparent. This task, long established by custom, has now unconsciously grown to proportions under which the community as well as the companies stagger.

—JOHN A. BEELER.

town for some time. Fig. 2, which is a summary of the evening counts outbound, indicates a nearly even distribution of walking from 4.30 to 6 p.m.

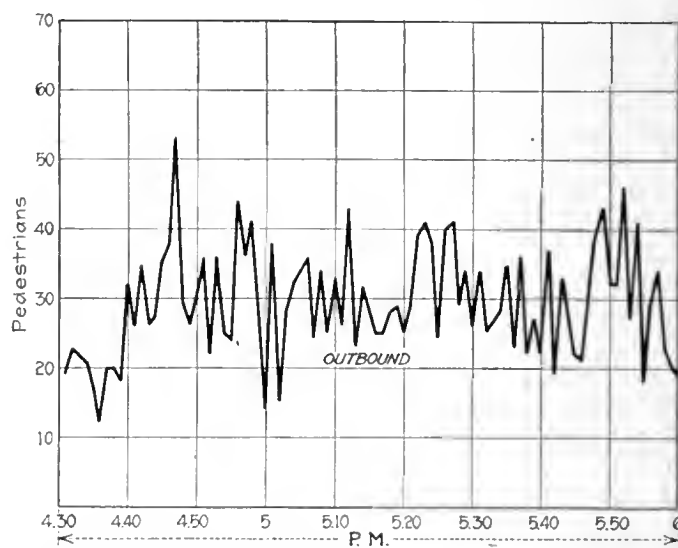
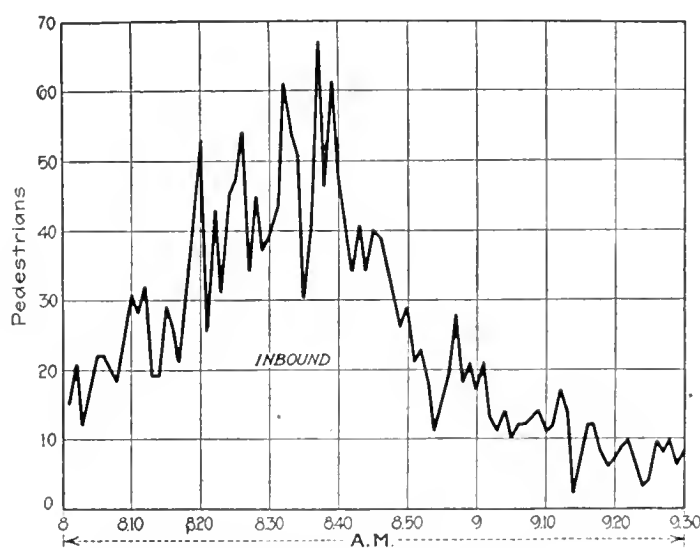
In addition to the walkers passing from the outer sections into that included within the eight count points, there are approximately 100,000 persons living in the territory inclosed within these limits. Most of these usually walk. Some of them would undoubtedly prefer to ride, especially if residing on one side of this area and working on the other, but on many lines they find the cars so packed at this hour that it is almost essential to cultivate the walking habit.

#### 57,000 PEOPLE RUSH TO WORK AT ONCE

To determine the exact number of employees involved, a questionnaire was sent out by the Public Utilities Commission. The returns were summarized to show the

made of all the principal government and other offices. The employees of some departments are quite prompt in arriving; those of other departments, and in all cases many individuals, come away ahead of time. Some departments show clearly defined times for opening and closing, while others do not. Quite a number work late, especially in the departments vitally concerned in the conduct of the war.

The character of the demand on the city's transportation facilities is shown in Fig. 4 and Fig. 5. These show the number of persons entering and leaving the buildings within a radius of three-fourths of a mile from Fourteenth and G Streets. This includes nineteen of the most important places of business in the city. The maximum minute in the morning was that from 8.52 to 8.53, in which time 672 persons entered the buildings counted. In the afternoon the peak came from 4.31 to



FIGS. 1 AND 2—PEDESTRIANS ENTERING AND LEAVING DOWNTOWN DISTRICT IN WASHINGTON DURING MORNING AND AFTERNOON RUSH

number of employees and their hours of work for practically all the government employees, and for typical private organizations. The number of people and the hours at which they are due to commence and end their work are illustrated graphically in Fig. 3. Each block represents 1000 people.

At 9 a.m., Mr. Beeler states, the blocks are stacked too high in comparison with other hours. The government employees furnish 37,652 or considerably more than enough without the addition of about 20,000 going to private offices and stores at the same time.

The enforcement of such an hour has proved impracticable, and any close observer will note that this stack of blocks has literally toppled over. A considerable number come early; many others are late. Many who desire to ride are forced to walk through sheer inability to get on board the cars at this hour in the morning.

In the afternoon the problem is decidedly less acute. The blocks are stacked at various hours, and none of the piles is nearly so high.

#### COUNTS AT BUILDINGS PROVE CONGESTION

The times of arrival and departure of employees follow quite closely the regular opening and closing hours for the various buildings. To test this, counts were

4.32, when 689 persons were counted leaving these buildings. A secondary peak occurred in the afternoon from 5.03 to 5.04, with 472 persons counted.

#### WASHINGTON HAS PECULIAR RAILWAY PEAKS

Counts made of the number of street car passengers, summarized in the curve in Fig. 6, show the morning peak inbound to be more than 25 per cent higher than the evening peak. It reaches its pinnacle with the cars due downtown slightly prior to 9 a.m., or in time for passengers to reach their offices at this time.

On the other hand, the afternoon peak of street car traffic is very different and much less severe. The peaks shown in Fig. 5 for persons leaving the buildings do not reappear in Fig. 6 for street car traffic. In the latter there is no sharp pinnacle. This is because the people do not all go home at once. The same is true of those who walk home after work, as may be seen in the chart of pedestrians leaving the downtown district (Fig. 2).

These peak loads, Mr. Beeler remarks, are different from those found in most other cities. Usually the morning peak occurs earlier and is not so sharp as in the evening. In Washington the reverse is true. It is much easier to care for a high evening peak, as the hours of the conductors and motormen can be so ar-

ranged as to permit the day runs to overlap the evening runs. With the high morning peak no such opportunity exists.

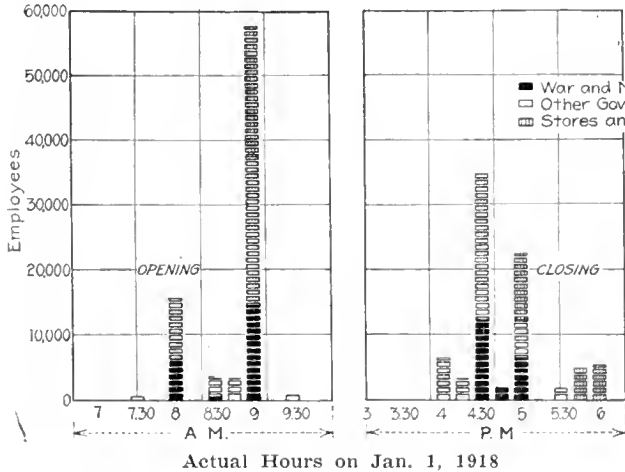
In order to provide for the tremendous morning load, the electric railway systems have found it necessary to work their resources to the limit. Were all the people shown in Fig. 3 to ride, the morning-peak problem would be even worse than it is. Each block of 1000 people would require about twelve street cars, each carrying eighty persons. To carry the entire load would therefore mean the operation of the cars so that 720 would arrive downtown just prior to 9 a.m. This is clearly an impossibility. If but half this number desired to ride, 360 cars would be required.

The greatest number of cars now arriving downtown in the morning by fifteen-minute periods is recorded between 8.30 and 8.45 a.m., when 161 cars are due. The normal number of cars required during the non-rush hour is at present less than eighty for each fifteen-minute period of the daily operation of the companies.

Even with the lower and flatter evening peak both companies in Washington run more cars than during the morning peak. The maximum number of cars scheduled to operate during the rush hours are as follows:

	Cars Scheduled	
	A.M. Rush Hour	P.M. Rush Hour
Washington Railway & Electric Company...	298	354
Capital Traction Company.....	217	231
Total.....	515	585

These figures represent the schedule requirements, but frequently both companies fall below in the actual number of cars operated, the reason being the shortage



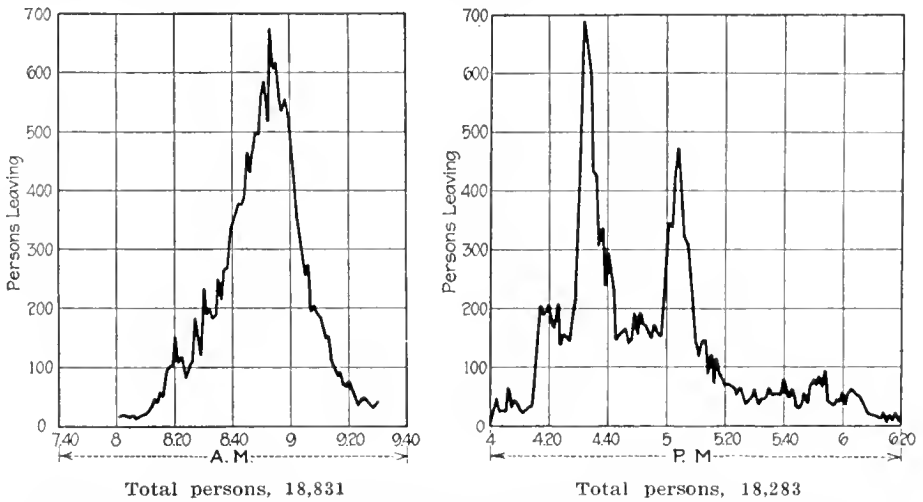
FIGS. 3 AND 7—OPENING AND CLOSING HOURS IN GOVERNMENT DEPARTMENTS, STORES AND OFFICES

of men. During the winter this has been occasioned largely on account of sickness.

In order to alleviate existing conditions Mr. Beeler made a study to determine to what extent the usefulness of the electric railway facilities could be enlarged and employed to better advantage by a change of the hours of opening various offices, so that the employees would

not all desire transportation at once. If the sharp morning peak could be modified, it appeared certain that the afternoon peak would be similarly changed. There would be little likelihood of congestion arising from any reasonable hour of closing the various offices, unless too great a number were set to close at a later hour.

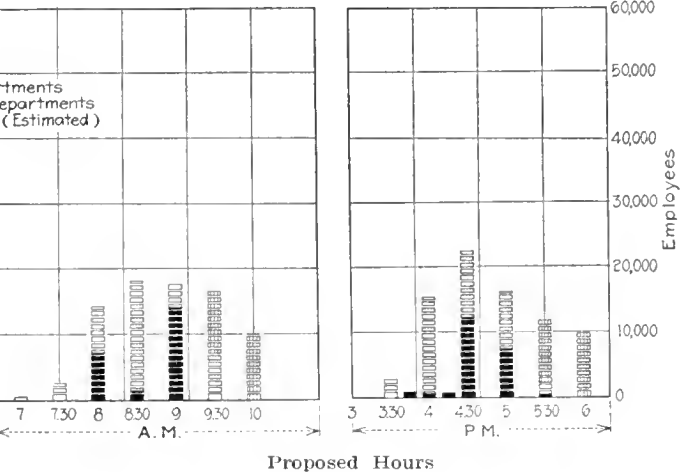
Another point kept in mind was the fact that the hours of various buildings in the same territory must



FIGS. 4 AND 5—COMPOSITE COUNT OF PERSONS ENTERING EIGHTEEN AND LEAVING NINETEEN PLACES OF EMPLOYMENT IN CONGESTED DISTRICT

be changed so that the loads on the cars do not coincide. Otherwise the hours might be changed so that the totals would appear well balanced, while in reality the congestion at certain localities might be worse than before. These factors in a large measure dictated the proposed hours of opening.

Furthermore, it was realized that groups of offices having business in common should be accorded the same working hours as far as possible. For this reason it was not considered generally desirable to split the hours for the employees in a single building. Finally, since changes generally are disapproved by those with firmly established habits, the modifications in hours proposed



were reduced to a minimum consistent with the purpose of obtaining the maximum degree of good service from the transportation system for the car rider.

In arranging the various proposed changes in opening hours, Mr. Beeler considered first the needs of the Army and the Navy. The United States is in the midst of the greatest war activity ever known. The Army and

the Navy Departments have in hand all they should do without having any new problems raised for their consideration. For the present, at least, Mr. Beeler says, there need be no change in their hours, which are in fact already staggered to a greater extent than those of the other departments.

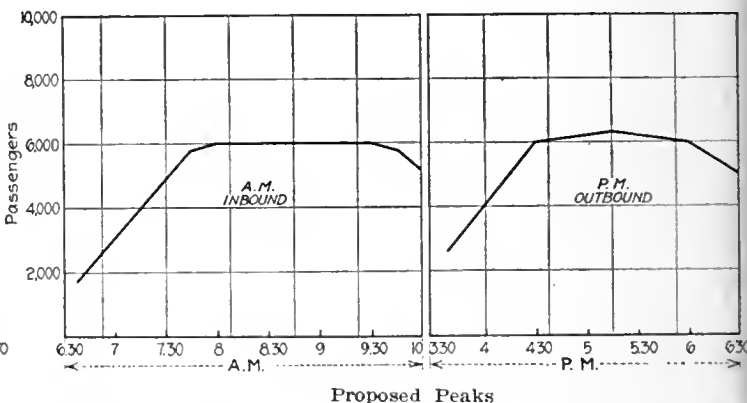
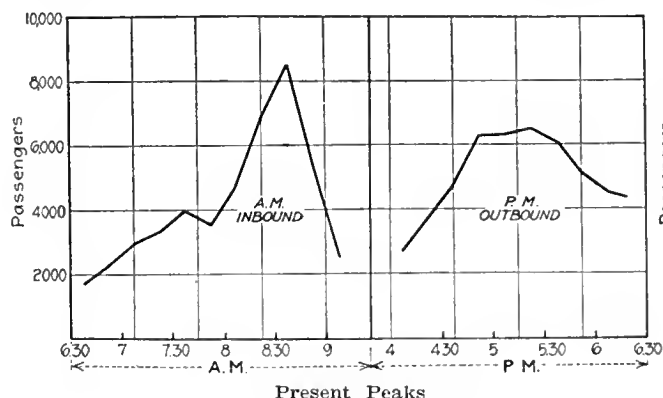
Since Washington is essentially a governmental city, other government business should rank second in importance. After the provision of a clear right-of-way for the Army and the Navy, the other departments should have their hours arranged so as to fit into the general scheme to permit a more even distribution of the opening and the closing hours, both the number of the employees and the locality of the buildings being considered. Some employees would be required to come earlier and some later than at present.

The private interests in Washington would be of third importance in fixing new opening hours. In Mr. Beeler's opinion, the private offices could readily open at 9.30 a.m. In fact, many of them are now opening after 9 a.m., and the change should not work hardship on anyone. All stores, including department stores (except

The hours proposed for each of the government offices are shown in Mr. Beeler's report in detailed exhibits, which give respectively the times for opening and closing each office, and the number of employees involved. In general, the hour of opening has been advanced from thirty minutes to one hour, and the closing hour similarly changed. A brief summary of the new opening hours is as follows:

Government offices, non-war activities .....	8.00-8.30 a.m.
Government offices, war activities .....	and 9.30 a.m.
Private offices .....	9.00 a.m.
High schools .....	9.30 a.m.
Stores (except those now opening prior to 8.30 a.m.) .....	9.30 a.m.
	10.00 a.m.

A summary of the recommended changes in hours for the various government departments is shown in Table I, and the percentages of the employees affected are presented in Table II. The latter table shows that out of a total of 68,107 government employees, 42,870 or 63 per cent have their hours unchanged. Of the remaining 25,237, 4.4 per cent have their hours placed fifteen minutes ahead and 21.4 per cent thirty minutes



FIGS. 6 AND 8—ELECTRIC RAILWAY LOAD CURVES UNDER PRESENT CONDITIONS AND UNDER PROPOSED CHANGES IN OPENING HOURS OF BUSINESS

those now opening at 8 a.m. or before), should be opened at 10 a.m. and closed at 6 p.m. This would enable the employees to ride both ways when there is plenty of room on the cars. It would give the employees a slightly shorter working day, and they in turn should become more efficient. For some people there might be less time for shopping, but there would be ample time for buying. Keeping the stores open until 6 p.m. would enable the government employees to do their shopping after hours and in more comfort than at present, as the time is quite limited.

At present little or no business is transacted in the stores prior to 10 a.m. The change in hours would undoubtedly prove beneficial to the proprietors, employees and the public. The big stores, Mr. Beeler says, have expressed a willingness to co-operate and have shown a most commendable spirit to further the efforts of the Public Utilities Commission in every way in the solution of this problem.

The high schools, which open at 9 a.m., add a considerable burden to the transportation system. They could be set back to 9.30 without difficulty, as the day is comparatively short, and the students are home before the evening rush begins. Other educational institutions do not in any considerable degree affect the morning peak.

earlier. Only 2.2 per cent have their working day as much as one hour earlier. The number whose hours are thirty minutes later is 9 per cent of the total.

The private offices being set back thirty minutes will take 10,000 persons off the 9 a.m. peak, and the stores similarly being changed to 10 a.m. will remove an additional 10,000 from the rush hour. The high schools, while contributing a relatively small number, do add considerably to the overloading and can materially aid the situation and benefit themselves by changing the opening hour to 9.30 a.m.

#### BETTER SERVICE AND LESS DYSPEPSIA

These proposed changes in working hours, Mr. Beeler believes, will result in a material improvement in the appearance of the load curves. Fig. 7 indicates how the load will be spread out provided these changes are adopted and become effective. The blocks are here stacked in several piles, and the danger of falling over is greatly lessened.

The probable resulting load that will come to the traction lines is forecast in Fig. 8. It is readily seen that the companies should not only be enabled to handle in comfort thousands who are now compelled to walk, but that seats will be available through both the morning and the evening rush hours for a much greater



TABLE I.—SUMMARY OF RECOMMENDED CHANGES IN GOVERNMENT OPENING HOURS IN WASHINGTON

Department	Opening From	Changed To	Number of Minutes		Number of Employees
			Ad-vanced	Put Back	
Agriculture.....	9.00	8.30	30	..	3,143
Civil Service Commission.....	9.00	8.30	30	..	450
Commerce.....	8.45	8.30	15	..	600
District Building.....	9.00	8.30	30	..	1,000
Engraving, Bureau of.....	8.00	7.30	30	..	2,500
Food Administration.....	9.00	8.30	30	..	1,100
Fuel Administration.....	9.00	9.30	..	30	450
Interstate Commerce Commis-sion.....	9.00	9.30	..	30	830
Interior.....	8.45	8.30	15	..	2,328
Labor.....	9.00	8.00	60	..	450
National War Savings Com-mission.....	9.00	9.30	..	30	120
National Defense, Council of.....	9.00	9.30	..	30	1,000
Patent Office.....	9.00	8.30	30	..	984
Pensions, Bureau of.....	9.00	9.30	..	30	963
Post Office Department.....	9.00	8.30	30	..	1,833
Public Information, Commis-sion on.....	9.00	9.30	..	30	150
Reclamation Service.....	8.45	8.30	15	..	81
Red Cross, American.....	9.00	8.30	30	..	711
State.....	9.00	8.30	30	..	300
Trade Commission, Federal.....	9.00	8.30	30	..	400
Treasury.....	9.00	9.30	..	30	2,672
War Department, Army Medi-cal Museum.....	9.00	8.30	30	..	140
War Department, Auditor.....	9.00	8.30	30	..	350
War Risk Insurance.....	9.00	8.00	60	..	1,050
War Risk Insurance.....	9.00	8.30	30	..	500
War Trade Board.....	9.00	8.30	30	..	1,100
Weather Bureau.....	9.00	8.30	30	..	32

proportion of the total passengers than ever before possible. There will be less danger of delay to the service, and hence less need for tardiness.

The spread in hours has been made sufficient for the cars to take down one load, return to the outer terminals and take down another. This can be repeated a number of times on practically all of the city lines. Short-line cars, or those which only run a portion of the way to the outer terminal, can also be used to better advantage. With the faster schedules possible by the use of the skip stop, the same number of cars now used will give a much improved service.

The time-tables will, of course, have to be readjusted to fit the new conditions. It should be possible, it is said, to rearrange the hours of work for the conductors and motormen so that they, too, will share in the benefit of the change in office hours. Since the cars will be in service longer during the rush hour, there should be fewer "trippers" and "split runs." This will remove one of the sources of complaint of the men.

An incidental advantage of the staggering of hours will be a more uniform distribution of the load on the power plants, which will permit more economical use of coal. The line voltage will be maintained more readily, which should insure an even operating speed throughout all periods of the day.

Suburbanites should be especially benefited by the improved car service. A regularity of headway on the long lines will be especially helpful instead of the flocks of cars which are now run in an effort to care for the excessive peak. This should result in opening up

suburban territory to a larger number of workers, including those who are boarding, and so relieve the congestion of the downtown districts.

The noon hour for lunch should be moved ahead or back to correspond with the opening hour. This will tend to spread out the peak load in the restaurants, so that conditions of crowding should not be so serious as at present. This should result in better service, less dyspepsia, and hence more efficient work for the government.

In short, Mr. Beeler avers, this staggering of the hours should be of great advantage to all business interests and the car riders themselves. The present tremendous crush that now occurs daily, due to nearly everyone in the city trying to observe the same hours, affects the entire commercial life of the community more or less. There is no really valid reason why anyone should insist on its continuance except that it is a long-established custom and difficult to change.

NEW OFFICE BUILDINGS SHOULD BE OUTSIDE

In conclusion Mr. Beeler mentioned the fact that the government is now building in Potomac Park two office buildings which will hold 15,000 employees. An extensive rerouting of the lines of both companies in Washington may be necessary to provide satisfactory transportation to this section. The hours for opening and closing for the new employees will also have considerable bearing upon the subject. This tremendous new development presents an acute problem which will be made the subject of a future section of this report.

If still further additions to the government offices are made, however, Mr. Beeler thinks that it would be well to consider locations near the outer ends of some of the existing car lines now operating a good, heavy service. This would at once render available a large amount of transportation facilities now idle, both during the opening and the closing hours. The cars are only very lightly loaded in the reverse direction of travel both morning and evening. This new traffic, being in the reverse direction, would make possible the utilization of the available capacity which is now wasted.

U. S. Chamber of Commerce Backs Peak-Flattening Movement

IN A BULLETIN issued recently by the Chamber of Commerce of the United States communities in which shipyards are located are urged to co-operate with the local electric railways in getting the shipbuilders to and from their work. The bulletin states:

"Of capital importance also is the question of carrying workmen to and from their work. The car lines in many communities are unable to meet the extra load which the influx of thousands of workers has put upon them. Some communities have had to solve the problem by changing the local business schedules by opening stores and offices a half hour later in order to have two peak loads and so give the workmen a rush hour of their own each morning."

Another very practical suggestion is that representative men of the communities "sit in" with the shipbuilders once a week and actually go over the problems of the latter to find out just how help can be given and then to give that help most urgently needed.

TABLE II.—PERCENTAGE OF WASHINGTON EMPLOYERS AFFECTED BY PROPOSED OPENING HOURS

	Number	Per Cent
Government employees with hours unchanged.....	42,870	62.9
Government employees with hours advanced fifteen min-utes.....	3,009	4.4
Government employees with hours advanced thirty min-utes.....	14,543	21.4
Government employees with hours advanced sixty min-utes.....	1,500	2.2
Government employees with hours set back thirty min-utes.....	6,185	9.1
Total of government employees with changed hours..	25,237	37.1
Total government employees.....	68,107	100.0
Private offices set back thirty minutes.....	10,000	.....
Private stores set back thirty minutes.....	10,000	.....
Total employees considered.....	88,107	.....

# Boston Elevated Maintenance Practice Discussed by Officials

At Hearings Before Massachusetts Public Service Commission M. C. Brush, John Lindall and H. B. Potter Explain the Difficulties Involved in the Upkeep of Equipment Under Present Conditions

**A**N EXTENDED discussion of the operating and maintenance practices of the Boston Elevated Railway was recently begun before the Massachusetts Public Service Commission, which is reviewing the report of John A. Beeler to the board upon the company's methods, submitted in November, 1917. Before the hearings are concluded the commission expects to make a thorough inquiry into the possibility of effecting increased economies in operation, service improvements, etc., along the lines recommended in the report. The hearings are being attended by President M. C. Brush and department heads of the company.

## POSSIBLE PAINTING SCHEDULE WILL NOT MEET REQUIREMENTS

The painting of semi-convertible cars was the first topic discussed. President Brush conceded that these cars have been insufficiently painted, but pointed out that they are in practically constant service and that the company lacks funds with which to paint rolling stock at the desirable intervals. From 40 to 50 per cent of these cars are stored out of doors, as the carhouses are not, in general, suitable to accommodate cars of these sizes. The posts and columns are usually suited to 25-ft. body cars of the type formerly standard on the system. Some rebuilding has been done, but at great expense.

The facilities for painting are limited, also, space being available for but forty-eight cars in the several paint shops at any one time. The cars are now being painted on an average of once in three years, taking the road as a whole. Mr. Brush favored an annual painting, where possible. In the East Boston tunnel the severe grades impose heavy use of brakeshoes, and the dust covers the outsides of the bodies to such an extent that after a month or six weeks, the cars do not show the benefits of painting. It has been necessary to paint the roofs of steel elevated cars yearly on account of the thin material used. The demand for rolling stock has been so great on the system that painting has had to be postponed in many instances, wholly apart from the physical needs of the cars. In addition to all of this, experienced painters have been extremely difficult to obtain, under the present labor conditions.

John Lindall, superintendent of rolling stock and shops, testified that the time required to paint a car averages from seventeen to twenty days, depending upon the condition of the seat mechanism and other body repairs which are undertaken during withdrawal from service for painting.

Mr. Brush said that detailed plans have been made by Mr. Lindall for a centralized modern repair shop plant in the Everett district, to supersede the existing scattered repair shops and to permit the work to be

done at maximum efficiency. The raising of the money for the shops, however, is a problem. The company purchased a suitable site in connection with its right-of-way for the Everett elevated extension. All surface car and rapid transit line rolling stock repairs would be concentrated at this point.

Regarding the failure of cars in the recent extremely cold period. Mr. Brush said that the Boston company was in exactly the same position as other roads. It was impossible to get armatures fast enough to replace those which went out of commission. Seventy-four additional winders were employed at the Albany Street shops and the output was increased from a normal of seventy armatures wound per week to 166. The centralized shops would permit the simultaneous overhauling of bodies, motors and trucks, which is not at present feasible in view of the separation of shops for different classes of work at Boston. Mr. Brush said it is impossible to estimate accurately the amount which will be required for maintenance and reconstruction in any particular year because of the uncertainties which arise in railroading. Thus, in track and roadway, the sudden decision of a municipality to perform work on streets may throw a heavy and unexpected burden upon the operating company in connection with maintenance.

Mr. Lindall said that thorough inspection is done upon the semi-convertible surface cars on a basis of 800 miles operation. The mileage system of inspection has been in vogue at Boston since 1905. The company has made arrangements with the General Electric Company for the replacement of 100 GE-202 motors which have proved expensive to maintain; and has been delayed in spite of priority orders in securing the new type of motors expected under the replacement order. Most of the semi-convertible cars of the company are operated eighteen hours a day and every day in the year except Sundays.

## MR. BRUSH DOES NOT FAVOR PUTTING MOTORS ON PRESENT TRAILERS

Regarding Mr. Beeler's recommendation that the company's 175 stepless, center-entrance trailers be modified and equipped as motor cars for all-day service, Mr. Brush said that this would be impracticable. These cars cost between \$3,000 and \$3,500, according to Mr. Lindall's recollection, and to equip them with motors would be very expensive. The trailers were designed for lightweight service during rush hours, and it is believed that the cars are the lightest per seat in the country. The company needs more trailers, in Mr. Brush's opinion. With their operation the public has been greatly pleased. New trucks would be required if the trailers were motorized, with new air-brake equipment, new control, reinforced underframing, changes in the hand-

brake rigging, lining of the underside of the car with metal, construction of a cab on each end, with respacing of seats, rewiring, repiping and other changes which would cost \$5,000 or \$6,000.

These trailers, if equipped with motors, would not be strong enough to pull another trailer, while to make this change would take at least eighteen months. They are useful as trailers because 13 per cent of the company's traffic is handled between 7 and 9 a.m., and 26 per cent between 4.30 and 6.30 p.m. The additional weight of the equipment with motor-car service would undoubtedly shorten the life of the car, the weight increase being estimated at 9 tons, from a present weight of 13 tons. Mr. Brush said that if he had the funds for new equipment he would appeal to the Electric Railway War Board for priority deliveries, and expected that he would receive them in view of the recently expressed opinions of President Wilson and Secretary McAdoo upon the essentiality of public utilities. Mr. Lindall stated at this point that deliveries are now nine to twelve months on trail cars and eighteen to twenty-four months on motor cars.

#### NEW EQUIPMENT BEST FOR TRAIN OPERATION

Mr. Brush said that the company is paying 50 to 100 per cent more on practically all supplies and equipment than a few years ago. Brakeshoes have advanced 263 per cent. The estimated cost of equipping present semi-convertible cars for multiple-unit operation is from \$2,500 to \$3,000. Mr. Brush disapproved of the utilizing of the semi-convertible car in train service, running a two-entrance car with one man.

H. B. Potter, assistant to President Brush, said that he knew of no case where in two-car train operation the conductor of the forward car controls the operation of the rear door of the forward car and the front door of the second car. In general, the company favors the purchase of complete new equipment for train operation rather than the attempt to operate older types of semi-convertible cars in trains. In view of motor difficulties on the company's No. 3 semi-convertible cars, it had been suggested that the gear ratio be changed to reduce the maximum speed and reduce thereby the burden upon the motors, but the replacement of older-type motors with more modern equipment appears the better solution.

Mr. Potter said that the company's policy is in the direction of increasing the maximum speed of cars rather than the reverse, in order to render better service. The cost of changing the gear ratio might run from \$250 per car against from \$2,500 to \$3,000 per car for new four-motor equipment, but the improved service of the later motors justifies the greater outlay. The company feels that it is cheaper to buy 100 new motors than to maintain the old ones (GE-202's). The manufacturers make an allowance per motor in the case of these older units which entered service about ten years ago, at the beginning of interpole motor design.

#### CARS INSPECTED EVERY 1000 MILES OR LESS

Cars on the rapid transit lines are divided into six lists for inspection, making a weekly inspection of such rolling stock. An investigation of the mileage of cars between inspections showed that the average was 707 miles per week; sixty-two cars averaged 850 miles each;

thirty-one cars 950 miles; fourteen cars 1050 miles; three cars 1150 miles. It appeared doubtful if any cars ran as high as 2000 miles between inspections. An investigation was also made of pull-ins for defects which exceeded the average mileage, and it was found that cars pulled in were not in every respect cars which had been simply out a longer time than the others. A casual inspection is made of every car nightly. Inspection on a mileage basis is less practicable on the rapid-transit lines on account of the frequent shifting of cars in train make-ups, and temporary and special movements. The surface cars are inspected on a mileage basis, this being more easily arranged in view of the close control of car units there practised, including restricted schedules of service. The daily inspection includes an examination of equipment for condition of brakes, loose parts, condition of doors, seats, etc.

## Wisconsin Convention Discusses Operating Problems

**Metal Electrode Welding, Increasing Hydroelectric Plant Efficiency and Solution of War Problems Are Leading Topics—New Officers Elected**

THE program of the first day's session of the convention of the Wisconsin Electrical Association at Milwaukee, held on March 27 and 28, included papers devoted mainly to rates and rate increases. The "War Convention Banquet" was held on the evening of the 27th and, aside from the menu, was devoted entirely to subjects concerning the great world conflict. The attendance at both the convention and the banquet was approximately that of previous years.

On the second day all papers except that of M. C. Ewing of Wausau dealt with operating problems. Dean Treat, manager of the Wisconsin Light & Power Company, LaCrosse, Wis., read a paper on "Metal Electrode Welding." Mr. Treat pointed out the many advantages and savings made possible by the use of electric welding both in track work and in the shop. Following this paper was a general discussion of railway problems during which the various speakers expressed themselves as being in favor of one-man operation, a charge for transfer and a reduction in taxes rather than a 6-cent fare. An abstract of Mr. Treat's paper appears elsewhere in this issue.

An illustrated talk on "Increasing the Efficiency of Hydroelectric Plants" was made by Daniel W. Mead, consulting engineer of Madison. George E. Wagner, superintendent of plant, Madison Gas & Electric Company, Madison, Wis., then gave an illustrated talk on "Three-Phase Four-Wire Distribution," pointing out the advantages of this system as compared with the ordinary 2300-volt delta-connected system.

M. C. Ewing, secretary-treasurer of the Wisconsin Valley Electric Company, Wausau, then delivered a paper on "Utilities and the War." He pointed out that the war found the railways bound by such laws that their rates could not be increased like those of private industrial companies, that economies could no longer provide the necessary revenue and that increases were essential. Emphasis was placed upon the need of closer co-operation between electric railway employers and employees and upon the fact that extensions should

## Preventing Spontaneous Combustion of Coal in Storage

Knowledge of Fundamental Principles Is Necessary If Waste in the Pile Is To Be Prevented  
—Facts to Keep in Mind

**A**S MANY electric railways are planning to store as much coal this summer as they can obtain some suggestions just issued by the United States Bureau of Mines on the subject of spontaneous combustion of coal will be of immediate value. The bureau confines attention to the technical aspects of the problem, believing that the wisdom of establishing large storage piles is a matter to be determined from the facts in each case.

It is recommended that coal be stored in small quantities as near to the point of consumption as possible so as to avoid rehandling, extra transportation and the degradation of size which follows each rehandling.

If large storage piles are necessary these facts should be kept in mind: (1) The generation of heat is the result of slow oxidation of the coal surface. (2) This oxidation is much more rapid from freshly mined coal or from freshly broken surfaces. (3) The oxidation rate increases rapidly with increased temperature. (4) Different coals have different oxidizing rates.

### LOW OXIDIZING RATES DESIRABLE

Where there is a choice of coal the bureau recommends that coal of the lowest oxidizing rates should be chosen, if known. Between two coals, that which is least friable should be selected and it should be so handled as to produce the least freshly broken surface. The coal should be as cool as possible when piled, it should be kept away from extraneous source of heat, and alternate wetting and drying during piling should be avoided.

As it is the fine coal or slack that furnishes the largest coal surface in the pile, lump coal should be piled where possible, the fine coal being removed and used immediately. Although there is a difference of opinion as to the effect on spontaneous combustion of the sulphur content in coal and of the piling of dissimilar coals together, it will be safer to use a low sulphur coal where possible and put only one kind of coal in a pile. In addition to these precautions the ground on which a coal pile is built should be dry.

*(Concluded from page 661)*

wait, but that maintenance must be kept at its highest efficiency.

L. M. Burch, president of the Electrical Supply Company, Madison, presented an explanation of the aims and purposes of the new association of Wisconsin electrical and contractors and dealers and solicited the co-operation of the electric utility executives in carrying out the plan. The committee on resolutions passed a resolution supporting President Wilson and the country at war.

The officers elected for the ensuing year were: President, John St. John, Madison; first vice-president, Raymond H. Smith, Oshkosh; second vice-president, W. C. Lownsberry; third vice-president, B. O. Watertown; secretary, A. P. Pulliam, Green Bay.

Other suggestions made by the bureau are these: Coal piles should be well ventilated and the surfaces of the piles should be exposed to allow them to cool. If the latter is impossible air circulation within the pile should be restricted. Where good ventilation, such as is provided by piling lump coal, is not to be obtained, it is desirable to approximate the condition which would exist in airtight bins. For this purpose, in making a coal pile of mixed sizes, the coal should be so handled as to make a homogeneous pile and prevent the segregation of coarse and fine coal. It is common practice to limit the height of coal piles, first because the lower layers are crushed in a very high pile, second, because the larger the pile the smaller proportionately is the area of the heat dissipating surface. Twelve feet is a common limit of height.

### RECOMMENDATIONS FOR TEMPERATURE CONTROL

Whatever precautions are taken in piling coal provision should be made for keeping track of temperature rise and for rapid rehandling of portions of a pile in case of excessive heating. The bureau recommends that half-inch iron pipes be driven vertically into the pile 15 or 20 ft. apart. Into these pipes a maximum thermometer can be lowered to different depths to indicate the temperature of the pile opposite the thermometer.

A survey of the pile and of the temperature of all parts of the pile should be made twice each week during the first three months after the pile is made, and once a week thereafter until it evidently has ceased to heat. As soon as any portion reaches a temperature of 150 deg. Fahr. provision should be made for removing that portion, but actual removal need not begin until the temperature has reached 180 deg. The object of rehandling the coal is to allow it to cool below a dangerous temperature. Any method of rehandling which does not allow of cooling will always transfer the difficulty from the old pile to the new one, and it is generally useless to employ water in any attempt to cool a coal pile.

### Trainmen's Poster Revised

THE United Railways & Electric Company of Baltimore has rearranged the "Motorman and Conductor" poster, issued by the National Fuel Administration.

#### MOTORMEN and CONDUCTORS OUR COUNTRY NEEDS YOUR HELP

UNCLE SAM HAS PUT IT UP TO THE ELECTRIC RAILWAYS TO SAVE A MILLION TONS OF COAL DURING 1918. TO MAKE GOOD WE MUST EXERCISE THE STRICTEST ECONOMY EVERYWHERE. BY CAREFUL USE OF POWER WE OUGHT TO BE ABLE TO SAVE EVEN MORE THAN THIS.

#### HOW YOU CAN HELP

1. Get up to speed as fast and smoothly as safely and comfort of passengers will permit.
2. Coasting saves coal. Shut off controller and coast as far as possible before applying brakes.
3. It is seldom necessary to use current on down grades.
4. Bring car to a stop as quickly and smoothly as comfort of passengers will allow. With air brakes best results are usually had by making but one solenoidly strong application of air and then easing off.
5. Use judgment when a vehicle is just ahead, and let car roll instead of kicking up controller.
6. Avoid skidding wheels. Avoid fanning air. Heavier air applications can be used at high speeds than at low speeds.
7. Save coal by economizing on light and heat.
8. The conductor's co-operation with the motorman in handling bell cord and passengers will mean getting the cars over the road with the least consumption of current.

APPROVED BY UNITED STATES FUEL ADMINISTRATION, WASHINGTON.

TRAINMEN'S POSTER USED IN BALTIMORE

The revised form, which is on a card 6 in. high by 12 in. wide, is reproduced herewith. It is thought that the modifications improve the wording. The card is printed in red and blue inks and is designed for being posted in the motorman's cab.



# Springfield (Mass.) to Have Zone Fares

**Massachusetts Commission Recommends Two Five-cent Zones for Springfield, with Lower Fares When Tickets Are Purchased—Copper Zone System for Palmer and Westfield Districts**

THE Massachusetts Public Service Commission on March 30 approved the establishment of a zone system on the Springfield Street Railway, modified, however, from the plan proposed by the company. The commission held that the company's zone plan provided for too abrupt an increase in placing the fare at 5 cents in the central urban area and at 10 cents to the adjoining zone points, without any intermediate gradations. For this reason it suggested special reduced-rate tickets for travel in the two zones. The company's application was noted in the *ELECTRIC RAILWAY JOURNAL* of Aug. 4, 1917.

The commission recommended that the company take the following steps for the Springfield division:

1. Establish an inner zone, with the limits proposed in the schedule filed by the company.
2. Provide for a uniform cash fare of 5 cents in the inner zone, with free transfer privileges, and for a similar cash fare of 5 cents in the outer zone.
3. Provide for the sale of six tickets for 40 cents, or at the rate of  $6\frac{2}{3}$  cents each, good between any point in the inner zone and any point in the outer zone which is not more than 5 miles by rail from Court Square, Springfield. This will take in most of the city of Chicopee and Chicopee Falls, East Longmeadow, Longmeadow and Agawam, and the major portion of West Springfield, which is not within the inner zone. The limit for these tickets on each line need not be fixed at precisely the 5-mile mark, but may be placed, with the commission's approval, at any natural point of division which approximates that distance. Adjustment should be made on the lines to Chicopee Falls, which reach the same destination by routes of varying length, so that the fares to the common point shall in all cases be on the  $6\frac{2}{3}$ -cent basis.
4. Provide for the sale of six tickets for 50 cents, or at the rate of  $8\frac{1}{3}$  cents each, good between any point in the inner zone and any point in the outer zone which is beyond the approximate 5-mile limit in which the  $6\frac{2}{3}$ -cent tickets can be used.

For the Westfield and the Palmer divisions, the commission recommended the establishment of the copper-zone system upon the basis of a straight rate of 2 cents a mile, with a minimum charge of 6 cents for any ride covering not more than three zones and a uniform local fare of 6 cents in the heart of Westfield.

The company was organized as a horse railway in 1868. In the early days the cash fare was 8 cents, sixteen tickets being sold for \$1. With the beginning of electrical operation in 1890 the fare was cut to 5 cents, with no reduced rate tickets. The company now owns and operates 187.5 miles of city, interurban and rural track. The Springfield division includes all of that city and the adjacent area within the present 5-cent fare limits, including the lines in the city of Chicopee. The Westfield division connects at West Springfield, its main line extending through Westfield and Russell into Huntington, and including the local lines in Westfield. The Palmer division connects on the east at Indian Orchard and takes in the local lines in Palmer, Monson and Ware, its main line extending through Wilbraham and Palmer into Brimfield. The distance by rail from the eastern to the western limits of the system is about 50 miles. In-

terurban service is also shared with other companies to and from the cities of Holyoke and Worcester, Mass., and Hartford, Conn.

The old 5-cent fare area (Springfield division) totaled 61.5 square miles, the longest direct ride being 8.37 miles. The company proposed to divide this 5-cent area into two separate zones. The limits of the inner zone were fixed at points varying from 2.3 to 3.6 miles from Court Square, and the included area of the inner zone was 18.6 square miles. The following table shows the distance in miles from Court Square to the various outlying points, and the portions of the distance to be included, in each case, within the inner and the outer zones:

Route from Court Square to:	Miles in Inner Zone	Miles in Outer Zone	Total
Chicopee Junction via Brightwood.....	2.309	1.953	4.262
Market Square, Chicopee, via Glenwood .....	2.807	1.328	4.135
Chicopee Falls via Liberty Street.....	3.155	1.440	4.595
Chicopee Falls via East Springfield.....	3.653	2.016	5.669
Ludlow .....	3.201	5.170	8.371
Wilbraham Town Line.....	3.201	4.314	7.515
East Longmeadow.....	3.155	1.926	5.081
Longmeadow .....	2.874	3.262	6.136
Agawam-Connecticut State Line.....	3.416	4.343	7.759
Agawam-Feeding Hills.....	3.416	4.378	7.794
Westfield Town Line.....	3.324	2.911	6.235
Holyoke City Line.....	3.504	2.758	6.262

Under the company's plan the limits of the outer zone would in all cases coincide with the present 5-cent fare limits, except on the Westfield line, where 1.3 miles would be added by extending the limit in West Springfield from Tatham to the Westfield boundary. On the lines to Chicopee, tickets would have been sold at the rate of 8 cents each, good to and from points in the inner zone in lieu of a 10-cent cash fare; but no similar privilege would have been given, under the new schedule as filed, on any of the other lines.

In the Palmer division there were twenty-two overlapping zones, varying from 7.42 miles to 1.70 miles in length and averaging 5.09 miles, in each of which the fare was 5 cents. The company proposed to eliminate all overlaps and introduce two new limits in Palmer, so that there would be thirteen separate zones, varying from 6.54 to 1.70 miles and averaging 3.82 miles in length, in each of which the fare would be 6 cents.

In the Westfield division, to disregard certain short local lines in the thickly-settled portion of Westfield, there were thirteen zones, varying from 9.09 miles to 1.05 miles in length and averaging 4.14 miles, in each of which the fare was 5 cents. The company proposed to eliminate certain overlaps and to reduce the length of the first zone out of Westfield on the line to Springfield, so that there would be ten zones, varying from 7.79 to 1.05 miles and averaging 3.78 miles in length, in each of which a 6-cent fare would be charged.

In the opinion of the commission, the abolition of the overlaps in the Westfield and Palmer divisions would have undesirable results. In a few cases the fare would rise from 5 to 18 cents; in others, from 5 to



12 cents. Such increases, the board said, would be greatly resented by the population served and would lead to much walking or possible jitney patronage.

The commission concluded that the copper-zone system is far better adapted to these divisions. While such a system is still in the experimental stage, the outlook is promising. The commission stated that it could not determine the effects upon revenue, but suggested that new tariffs based upon 2 cents per mile be adopted. The average charge per mile for through traffic on the interurban line between Springfield and Brimfield would then be higher than the 1.74 cents proposed by the company, and on the Westfield-Huntington line there would also be some increase. On the other hand, the mileage plan would reduce the charge for many local rides, especially in Palmer, but less falling off in riding should be expected.

The commission held, however, that the town of Westfield is large enough to receive a uniform fare with free transfer privileges in a reasonably limited territory. It would be difficult to apply a mileage plan to the short local lines within the town. The commission recommended, therefore, that Westfield be given a uniform local fare of 6 cents, covering all short lines in the thickly settled district. Provision should be made in the tariff so that, in journeys between points in the Springfield division or the Westfield 6-cent zone and points in mileage territory, the minimum fare should not apply in the latter. Thus, in riding from a point in the center of Westfield to a point in the first mileage zone on the Huntington line, the fare should be 8 cents, instead of 6 cents plus the minimum mileage fare of 6 cents.

#### EASIEST FARE SYSTEM NOT ALWAYS THE BEST

In discussing the company's proposed inner and outer 5-cent zones for the Springfield division, the commission mentioned the argument of protestants that the suburban territory had been built up under the uniform fare system, with the understanding that this system was not likely to be disturbed, and that a departure from this system would be unjust and prejudicial to the inhabitants and especially to the owners of real estate. The fear that a zone system would have any substantial influence upon land values in these districts is not, the commission said, well-founded. But even if it should have such an effect, it is no doubt a fact that the extension of electric railway lines into this territory materially increased these values in the past, and that land owners enjoyed and profited by this unearned increment. If they should be deprived of some slight measure of this increment by an attempt to apportion the mounting cost of electric railway service more nearly in accordance with the service furnished, they would have no reasonable ground of complaint. There has, in this instance, been no contract that fares would continue for any period of time upon the uniform basis, such as has existed in the Boston district.

The substitution of a 6-cent fare for the present 5-cent fare in the Springfield division would undoubtedly be the easiest and simplest method of dealing with the situation, and it is quite possible that it might meet with less open and immediate criticism than any other. It is also true that there are difficulties in the application of a zone system, and that no practicable

system of fares can be devised which will be entirely free from inconsistencies or minor discriminations. The easiest way is not always the best, and experience has shown clearly that there are serious objections to a straight increase in fare in urban territory, such as is included within the Springfield division.

Continuing, the commission said:

"Experience has seemed to demonstrate, and electric railway managers are very generally of the opinion, that an increase from 5 to 6 cents discourages short-haul riding, encourages competition and appreciably diminishes the kind of traffic which it is particularly desirable to attract. The importance to the public, as well as to the company, of doing everything that can be done to hold and increase this short-haul business is obvious. The best means of developing it is, clearly, to retain a low minimum fare. If a straight raise to 6 cents were made, and results did not prove satisfactory, the next step would be a 7-cent fare, which would have an even more unfavorable effect upon short-haul traffic. On the other hand, a 5-cent fare is convenient and popular, encourages riding and is an excellent weapon with which to meet jitney competition.

"The short-haul rider has been discriminated against, up to the present. A 5-cent fare is ample, in urban territory, to cover the cost of service, and if a readjustment should be made which would retain that fare for the shorter distances and require the long-haul rider to pay a charge more nearly proportional to the cost of carrying him, certainly no injustice would be done. Under the circumstances the commission is of the present opinion that some form of 'zone system' will, on the whole, produce better results for the community than the adoption of a uniform 6-cent fare. We realize the practical difficulties in the application and the operation of such a system. Experience as yet is so limited that no one can positively affirm that expectations will be realized. The theoretical advantages, however, warrant us in feeling that the experiments should be tried."

#### GRADATION OF FARES NEEDED BETWEEN ZONES

The plan contained in the schedule filed by the company was considered objectionable, however, for two reasons. In the first place, if the estimate of the company is correct, its plan would produce substantially more revenue than the amount shown to be reasonably required. The estimate is \$477,762, and this was based on the traffic in the year ended June 30, 1916. For the calendar year 1917, the amount is increased to nearly \$520,000—to be secured from the Springfield division. The commission's estimate of additional revenue required is \$400,000 for the entire system. Of that \$60,000 can be obtained from the outlying divisions. This makes the amount assessable against the Springfield division about \$340,000.

In the second place, the board said, the zone plan proposed is not well considered. The fare jumps abruptly from 5 cents to 10 cents, without any intermediate gradations, creating the same undesirable conditions which led to the development of the overlapping zones in the Palmer and Westfield sections.

On the whole, the commission was not disposed, for the present, to disturb the inner zone limits as fixed by the company. Actual experience might develop valid reasons for making some adjustments in certain in-

## Metal Electrode Welding\*

How the Electric Welder Helped One Property to Keep Its Equipment in Repair

BY DEAN TREAT

Manager Wisconsin Railway, Light & Power Company,  
La Crosse, Wis.

THREE important points in favor of this kind of welding are: (1) Direct current is easily available to railway operators; (2) only simple apparatus is used, and (3) various types of work are possible at a comparatively low cost. The type of machine selected by us consists of a four-wheeled hand-drawn set of resistors with circuit-breaker cables sufficient to secure proper electrical contacts. It can be operated by an ordinary track man without a great deal of instruction. The average time to weld 1 lb. of electrode is about fifteen minutes; the average cost of the current used, based on 1 cent per kilowatt-hour, is 15 cents, and of labor, based on 30 cents an hour is 7½ cents. This makes a total cost of 22½ cents per pound of melting.

Our first test made was the welding of plates on 80-lb. T-rail that was slightly battered at the joints due to working which had partially destroyed the concealed type of bonds. The plates were put on in the fall as a test and proved entirely satisfactory. The cost was about \$4.50 per joint.

We have installed 230 pairs of these plates and after two winters not a joint failure has been found. Battered edges were built up and ground for a span of 9 in. on each side of the joint. On one stretch of track, 4000 ft. of 66-lb. rail had to be built up at practically every joint, ½ in. of metal being added in some cases. The special work in all parts of the city and badly worn railroad crossings were built up successfully, the former without removal or disturbing the paving, and apparently can be kept up until such time as defects develop that cannot be repaired by the electric welder. At one town on our system in 1916, electric welded plates were installed on a 70-lb. T-rail for about 3500 ft. during a concrete paving job, and they have proved entirely satisfactory, showing no breakage. We have

also used the welder for repairing cupped joints and special work, car seat frames, gear and pinion seats, skids used during broken axle trouble, drawbar heads, motor casing breaks and gear cases. It has also been used for filling in worn-out holes in brake rigging and when plugging and redrilling axle bearings.

On two paving jobs welded plates on over a mile of single track were installed when the temperature was about 90 deg. Fahr. During this winter as low as 26 deg. below zero was recorded, giving a range of 116 deg. Fahr., yet not a single failure occurred at the joints or elsewhere in the rail section. From tests, over 150 per cent conductivity has been found at the joints and the joints are located with difficulty either with the eye or when riding over them in the cars.

Our costs for the welding of plates to serve as angle bars and bonds on 73-lb. T-rail were \$4.73 per joint. On cupped joints the cost was from 25 cents to 75 cents per joint, although a very unsatisfactory hand grinder was used. On shop work repairs the cost was from 1 to 9 per cent of value of the article repaired.

In conjunction with the electric welder it is essential to have a satisfactory grinder to smooth the work and give it an even surface. The grinder first used by us did not prove entirely satisfactory due to the unequal hardness of the rail and the weld. There was a tendency for the adjoining portions of the rail to be worn away more than the weld. The experiment of grinding out the cup to make a gradual depression rather than of trying to build it up was tried and proved quite successful for a temporary arrangement.

A few tests have been made on 45-lb. T-rail in which the bolts were first tightened up, then the angle bars were welded to some of the bolts and also along the lower edge of the angle bar to the rail base. The cup at the joints was then built up and ground smooth. This work has passed through the winter entirely satisfactorily which would indicate that this rail can be kept in use until permanent paving is laid.

The sum of about 30 cents per day will pay for the overhead expense of an electric welder, and one railroad crossing saved will more than offset the expense of the machine for one year. Electrode welding has been rightly, though not completely, named "first aid to injured track and shop equipment."

(Concluded from page 664)

stances, it said, and the matter will be regarded as open for future consideration, without prejudice, after such experience has been secured.

In the case of the outer zone there are two different methods by which a gradation of fares can be established between the minimum and the maximum. Provision can be made for successive concentric sections, in each of which a small additional cash fare of 1 or 2 cents would be charged, or provision can be made for intermediate steps through the sale of tickets. The latter plan, which the commission recommended, has the advantage that it simplifies fare collections by eliminating the handling of pennies, and any person who rides with any frequency can easily obtain the advantage of the reduced rate. Those who ride very infrequently may prefer to pay the full cash fare rather than to invest in tickets. To the commission's mind, however, it is not unfair that riders of this class should

be charged a higher rate, and by so doing the ticket rate can be kept lower than otherwise possible.

Operating economies, the commission thought, would be possible along certain lines, such as the prohibition of automobile parking in the congested territory; provision of safety zones and multiple-berth stops (the latter are now in use); increased street inspection, fewer stopping places, improved handling of cars, operation of turn-back cars, use of limited-stop cars, reduction of damages through improved operation, transfer changes and use of one-man car on some lines. The commission did not approve the suggestion of John P. Fox, the city's expert, that existing cars be quite generally operated by one man, by closing up the rear door and making other minor changes. In general, the commission favored the improved practises recommended by Prof. Albert S. Richey, Worcester, Mass., whose report was abstracted in the ELECTRIC RAILWAY JOURNAL of June 2, 1917.

\* Abstract of paper presented at meeting of Wisconsin Electrical Association, March 28, 1918.

## LETTERS TO THE EDITOR

### British and American Rail Sections

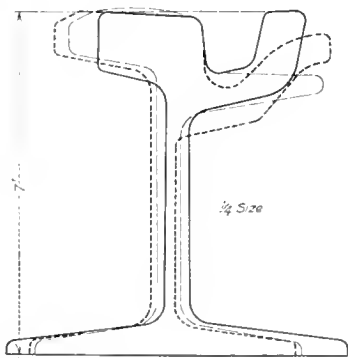
EDGAR ALLEN & COMPANY, LTD.

SHEFFIELD, ENGLAND, Feb. 20, 1918.

To the Editors:

I was much interested in the article in your issue of Dec. 1, 1917, by Mr. Schreiber upon tramway rails and have since read the comments by American way engineers on page 1126 of your issue of Dec. 22. These have also been summarized in the February issue of the *Electric Railway & Tramway Journal*.

The conditions under which tramways work in this country are, of course, widely different to the lines in the United States, and our Board of Trade would not permit the use in paved streets of any of the four rails mentioned by Mr. Schreiber. The use of only a grooved or Trilby rail, more severe than your Trilby, would be permitted. It is only of late years that wider grooves have been permitted. I inclose a compound section showing the British standard rails in combination with



Solid Line—Lorain Steel Co. Rail No. 434, 111 lb. per yard.  
Dotted — — — Lorain Steel Co. Rail No. 434, 101 lb. per yard.  
Dash — — — Lorain Steel Co. Rail No. 426, 101 lb. per yard.

COMPOUND SECTION SHOWING BRITISH STANDARD 4C RAIL WITH TWO POPULAR AMERICAN SECTIONS

Lorain Steel Company's sections 116/434 and 101/486.

Personally, I do not like any of the four sections Mr. Schreiber selects, and I do not agree with the arguments put forward. I fail to follow how street vehicles can either cross or turn out of the tracks laid with what you call a tram head without damage to their axles, let alone damage of the permanent way which is admitted, and even if all vehicles had pneumatic tires, both tires and axles must deteriorate from this cause. That, however, is looking at the matter from an English point of view which, after all, is the only view to take under English regulations. Furthermore, the Lorain grooved section 116/434 could not be used here for reasons already given, and you will note that our standard sections have a narrower and, we consider, a more perfect groove. Consequently the objections to the Trilby section would be greatly increased from the American aspect.

There are, no doubt, advantages which can be claimed by all the sections in accordance with conditions under which they are used; for example, an easier gage and easier running for the car wheels with your tram rail as against the English grooved rail. However, I do not admit the "greater noise" or increased derailments even through "special work." If the track is properly laid such derailments should be very few.

Speaking as a manufacturer, I do not think that British tramway engineers, even if permitted, would willingly change their present type of rail for the American types.

FRED BLAND, M. I. Mech. E.

Member Engineering Standards Committee.

### Malleable Iron Overhead Fittings

EAST PITTSBURGH, PA., March 28, 1918.

To the Editors:

In regard to the article by Charles Rufus Harte, on "Overhead Line Economies," as published in your March 16 issue, your readers may be interested in the following comments of our engineers:

The Westinghouse Electric & Manufacturing Company has manufactured and recommends the use of malleable iron trolley frogs, section insulators, crossings, and mechanical ears, for the last six or seven years, and the material installed in each case has given satisfactory service.

Very few of the large electric railway systems are to-day using bronze trolley frogs and crossings. Malleable iron wears better, is no more liable to arc than bronze, and, if an arc is formed on the malleable iron frog, the injury to it would not be so great as it would be if the frog were of bronze.

Bronze approaches, of course, are used generally as the greatest wear is at the approach, and where a flexible removable approach is installed, unusually long life of the frog and crossing proper is obtained.

M. C. TURPIN,

Assistant to Manager, Department of Publicity.

### Better Salaries for Technical Men

BOSTON, MASS., March 30, 1918.

To the Editors:

By way of introduction of such a subject, it is wise to start by giving a working definition of the phrase—technical men. All those who adapt the truths of science to the uses of industry may be included under this head.

Why do not engineers and chemists receive better compensation? The captains of industry immediately reply that supply and demand regulate the wage. The market is glutted with technical graduates who know nothing of adapting the truths of science to industry. They are mere possibilities of the future and need many years of experience. Our industrial captains few of whom have much acquaintance with technical subjects, allow these fledgling engineers and chemists to invade fields of endeavors at such low salaries as to drive out technical men of whose services the country is now in dire need.

That is the much mooted law of supply and demand. Much is thought of quantity but little of quality. The direct use of engineering brains is considered a necessary evil. It does not produce any immediate money return, as does the energy of a salesman. In Germany from thirty to one hundred times as many technical men are employed in industry as in this country. The press is full of the wonderful efficiency of the German "kultur." Much of it is due to the co-ordination of the financial and technical groups.

Heretofore, the truth-seeking ideal of the technical man has made him a class-less individual. There is a glimmering light of hope on the horizon—the rise of class consciousness. The power of the labor unions has undoubtedly helped the engineer, for many of the increases granted to technical men have been caused by the increased wages of labor.

TECHNICAL MAN.

## Tremendous Demand for Motormen's Power-Saving Books

NEW HAVEN, CONN., April 1, 1918.

To the Editors:

The influence exerted by your journal in the electric railway field has recently been brought home to me in a very striking way. About a month ago you published a short note referring to the Connecticut Company's power-saving campaign, and mentioned that a small handbook on power saving, written specially for motormen and conductors and used by me in this campaign, could be had at cost by other companies for use on their own properties. The result of this brief mention has been astonishing. From all over the country, from the Atlantic to the Pacific and including Canada, has come a flood of requests for copies. Frequently our mail would contain requests from the widest possible diversity of ranks, *i.e.*, from motormen, chief motormen, shopmen, master mechanics, superintendents, managers, and railway presidents. I have had temporarily to engage additional help to take care of the added work.

In a great many cases, and following receipt of the sample copy sent, orders for additional copies varying from fifty to several thousand at a time were received, depending upon the size of the road.

Noting the interest aroused and the kind reception which has been accorded the handbook, I followed up the matter by sending a complimentary copy to the chief executive on every electric railway operating more than twenty cars. A further rain of orders followed, and with each mail they are still pouring in.

From present indications it looks as though most of the platform men in the country will soon have been supplied with copies of these books.

WILLIAM ARTHUR.

## Investigation to Devise Means for Increasing Coal Output

The percentage of total available coal recovered in the process of mining is a factor of increasing importance under the present conditions when the demand for fuel is so abnormally high. Under the belief that the percentage of extraction at present is too low, especially in the mining of bituminous coal, the Engineering Experiment Station of the University of Illinois, in co-operation with the Illinois State Geological Survey and the United States Bureau of Mines, has undertaken an investigation of the subject. The results have just been published by the university and show that there is an excellent opportunity to improve conditions in the Middle West field by more systematic methods of mining.

On March 30 United States Fuel Administrator Garfield signed formal orders instituting the zone system of distribution for bituminous coal. Twelve general orders, imposing upon the movement of coal the limitations arranged by the Fuel Administrator and the Director General of Railroads were issued. They will be communicated at once to those charged with the enforcement of the zone system distribution plan.

## AMERICAN ASSOCIATION NEWS

### War Board Deprecates Making of Unnecessary Improvements

ON APRIL 2 the Electric Railway War Board sent out its fourteenth bulletin, devoted to the subject of "Unnecessary Improvements." The purpose of this was to call the attention of electric railways to a resolution of the recently organized War Industries Board, setting forth the necessity for the limitation of capital expenditures for either public or private undertakings not essential to, and not contributing either directly or indirectly toward, the winning of the war.

The Electric Railway War Board prefaces the resolution with a statement that "This imposes upon the management of railway lines a double patriotic obligation: (a) to forego for the duration of the war all expenditures which the management may have contemplated, no matter how advantageous they may seem for the company, unless the expenditures will directly help the government in the prosecution of the war; (b) to direct the attention of the proper local authorities to the position taken by the representatives of the national government to the end that the local authorities be induced to co-operate with the national government by foregoing, for the present, all public improvements which will not be helpful in the prosecution of the war, or which are not at this time absolutely essential to the welfare of the communities. This applies as forcefully to expenditures not connected with railway matters as to those affecting railway interests."

### National Committee Sends Out Pamphlets

THE national committee on public utilities, of which the American Electric Railway Association is a member, has issued in pamphlet form a copy of an address made by P. H. Gadsden, president Charleston Consolidated Railway & Lighting Company, before the City Council of Charleston on March 11, on the question of higher rates. The reasons which oblige the electric railway companies at this time to ask for higher rates are put forward by Mr. Gadsden, and it is thought that the pamphlet will be of general interest to utilities as a whole.

### Air Brakes Discussed at Portland

THE Cumberland County Power & Light Company section held its regular meeting on March 26, preceded by a supper. The principal speaker was George H. Martin, Westinghouse Traction Brake Company, who explained the operation of air brakes, particularly those of the type installed on one of the railway company's lines. The section orchestra played during the evening, and there was a patriotic talk on the income tax and the Liberty Loan by a local speaker. A commendable feature of the meeting was the discussion following Mr. Martin's talk. Numerous practical questions were to put the speaker, who in answering them was able to give just the information desired by his audience.



## Eliminating Unnecessary Lighting and Heating in the Carhouse

Fire Risk and Energy Waste Are Considerably Reduced by Cutting Off the Power Supply from Stored Cars

BY T. F. MULLANEY

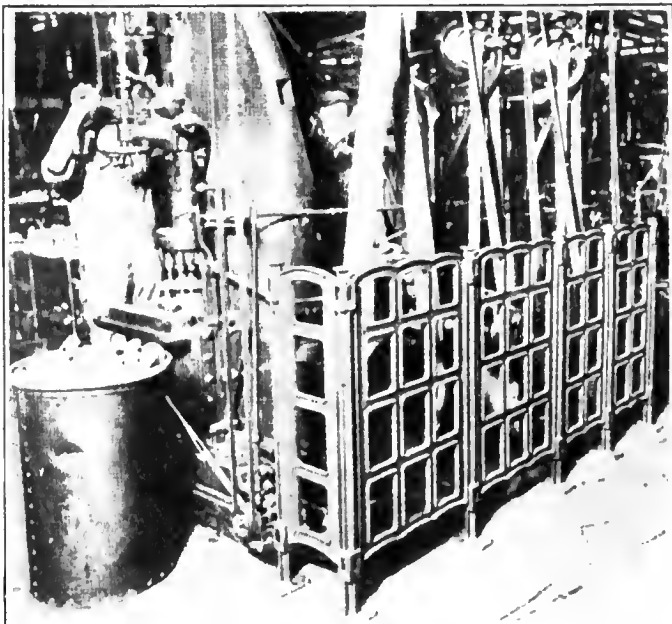
Former Chief Engineer Third Avenue Railway System,  
New York City

WE HAVE HAD a great awakening lately in regard to the waste of energy in the operation of cars over the line. Little thought has been given, however, to the waste of lighting and heating energy in cars standing in the carhouse. Crews are ordered, naturally, to cut off all power; but human beings are so forgetful or indifferent that thousands and thousands of tons of coal are burned up to no one's good except that of the coal dealer.

This subject was brought vividly to my attention some years ago in connection with the insurance of rehabilitated carhouses of the Third Avenue Railway System. The insurance companies wanted the fire risk reduced to a minimum, and this could be done only by cutting off power from the cars the moment they were stored. To meet this condition I invented an automatic time-limit circuit-breaker equipment, adjustable over a range of two to twenty minutes, now used by the New York Railways as well as the Third Avenue Railway System. The following figures give

### Sectional Guards for the Shop

THE subject of the National Safety Council Service Series No. 594 is "Guard Rails" for shop use. The guard advocated is sectional, as shown in the accompanying photograph, and is said to be the cheapest and most efficient known. The posts are fastened to the floor with screws and the sections are hooked into the posts in the same manner that a bed is put together. The sectional guard is especially desirable where changes are frequent, and once the patterns are made the cost is said to be very low.



GUARD FOR USE AT DANGER POINTS IN THE SHOP

some idea of the power waste in the needless heating and lighting of stored cars.

It is assumed that cars stored between the hours of 6 p. m. and 6 a. m. have twenty 23-watt tungsten lamps per car burning during these hours. It is also assumed that cars stored during the day time or the night time will be consuming power in their heaters during such storage hours.

The number of points of heat used would vary, of course, with the temperature as follows: From 32 deg. Fahr. to 40 deg. Fahr., one point of heat, equivalent to 2.7 kw.-hr. per hour. From 25 deg. Fahr. to 32 deg. Fahr., two points of heat, equivalent to 4.2 kw.-hr. per hour. Less than 25 deg. Fahr., three points of heat, equivalent to 6.9 kw.-hr. per hour.

An investigation of the Weather Bureau reports at New York City, for the year 1914, disclosed the following facts: Number of days when one point of heat would be required, fifty-two; number of days when two points of heat would be required, forty-nine; number of days when three points of heat would be required, fifty-five.

An investigation of the operating reports of one of the large railways of New York City also disclosed the following: Between the hours of 6 a. m. and 6 p. m., the average car in regularly scheduled service is stored for 4.08 hours. Between the hours of 6 p. m. and 6 a. m. it is stored for 7.36 hours. Therefore the total storage time per car in each twenty-four hours is 11.44 hours.

Accordingly the yearly power consumption in lamps and heaters for each scheduled car in storage and not including any cars in dead storage or in the repair shop, is as follows:

The energy consumed in lights for one average car is  $20 \times 23 \text{ (watt)} \times 7.36 \text{ (hours)} \times 365 \text{ (days)} = 1236 \text{ kw.-hr.}$

The energy consumed in the heaters is as follows:

One point of heat, 52 (days) $\times$ 11.44 (hours) $\times$ 2.7 (kw.-hr.) =	1606.18 kw.-hr.
Two points of heat, 49 (days) $\times$ 11.44 (hours) $\times$ 4.2 (kw.-hr.) =	2354.35 kw.-hr.
Three points of heat, 55 (days) $\times$ 11.44 (hours) $\times$ 6.9 (kw.-hr.) =	4341.48 kw.-hr.

Total..... 8302.01 kw.-hr.

The total energy for lights and heaters for each car per annum equals 9538 kw.-hr. At  $\frac{1}{2}$  cent per kilowatt-hour, the cost of this energy is \$47.69. This represents the amount which can be saved for energy alone where the proper devices are used for rendering dead the track circuits in the carhouses. Further, there is a substantial saving in lamp renewals where such devices are used, as follows:

The total number hours of burning per annum per car while it is stored in the carhouse between 6 p. m. and 6 a. m. is  $7.36 \text{ (hours)} \times 365 \text{ (days)}$ , or 2686 hours per annum.

On the basis of an average life per lamp of 1200 hours, this figure would represent a saving in renewals per car per annum of

$$20 \text{ lamps} \times \frac{2686}{1200} = 44.76 \text{ lamps.}$$



The saving in the cost of such renewals, based on a lamp cost of 18 cents each, would be

$44.76 \times 18 \text{ cents} =$	\$8.06
Energy saving, as above	47.69

Total ..... \$55.75

The total saving in cost of energy and lamp renewals of \$55.75 per car per annum is surely one saving worth striving for in such times as these.

## Center Entrance and Exit, Pay-as-You-Pass Trailers for Dayton

**People's Railway Handles Rush-Hour Travel with Light-weight Trailers Operated in Two or Three-Car Trains—Special Signaling Features**

THE People's Railway, Dayton, Ohio, operated by the American Railways, Philadelphia, has recently received from the Cincinnati Car Company ten new trail cars for city service. These weigh, light, about 22,000 lb. and are serving admirably in two-car trains for carrying workers to and from the various factories during rush hours. The company has some heavy double-truck cars equipped with four GE-80, 40-hp. motors, which, by changing the air brakes and installing signals and automatic couplers, have been made quite suitable for handling a train of two or three of these new trailers.

The cars have Heywood-Wakefield rattan-covered seats to accommodate fifty-five persons. These extend across both ends and along both sides, except at the double entrance and exit door opening in the center of one side. The doors are of the sliding type, 2 ft. 6 in. wide, operated manually by the conductor. He must stand to operate them, but may remain seated at all other times. Fares are recorded on Ohmer registers, but no fare boxes are used. The car is both pay-as-you-enter and pay-as-you-leave, depending on whether the passenger goes to the front or rear of the car. The passengers enter at the left door and pay when they pass the conductor either to go to the front end of the car or to leave. Thus when the rear half of the car is not filled, it becomes a loading platform for large crowds



FIG. 3—DAYTON TRAIL CAR WITH CENTER ENTRANCE AND EXIT DOORS

and the fares are paid later. A horizontal wooden hand rail extends the full length of the car on both sides.

Steel construction is used throughout, with stiffening on the dummy side furnished by two pier panels placed opposite the door posts. Between the sheet-steel roof and its canvas covering and below the window rails is a 1-in. layer of cork, which serves as a heat insulator. Four Peerless ventilators are provided on each side. There are Westinghouse automatic air brakes and Cincinnati arch-bar trucks with a 5-ft. wheelbase, the distance between truck centers being 21 ft. 8 in. Cast-iron wheels 24 in. in diameter, made by the National Car Wheel Company, are used, making the height of the step 16½ in. The step up to the car floor is 11½ in., with a 1-in. ramp in the entrance well.

An outstanding feature of these cars is the provision for signaling. The air and electrical connections, the latter including heating, lighting and signal circuits, are made by a Tomlinson automatic coupler, furnished by the Ohio Brass Company. There are three separate signal circuits, one to give the motorman a clear indication when all doors are closed, another to signal the motorman direct from the passenger's buzzers and a third, with buttons inaccessible to the passengers, to permit the members of the crew to signal each other.

The lighting system consists of three circuits of 20-watt lamps, and there are twenty-four 500-watt electric heaters per car, with Gold thermostatic control. The heating equipment and passenger buzzers were furnished by the Consolidated Car-Heating Company.



FIG. 1—STEEL FRAMEWORK OF THE NEW TRAIL CAR OPERATED IN DAYTON



FIG. 2—INTERIOR OF TRAIL CAR SHOWING CONDUCTOR'S POSITION



# **The Buying Line OVER HERE Helps the Firing Line OVER THERE**



## Recent Happenings in Great Britain

### Latest News Again Emphasizes Striking Similarity Between War Problems Affecting English and American Companies —Tramways Divided into Nine Areas

(From Our Regular Correspondent)

Conferences have been held recently between representatives of the tramway undertakings of the country and the tramways committee of the Board of Trade appointed to consider the difficulties of the various systems and to devise means to facilitate the continuance of tramway undertakings regarded as essential to the prosecution of the war. The committee has divided the country into nine areas, which have been placed in four groups under sub-committees, termed "area sub-committees." The nine areas are as follows: (1) Metropolitan and east coast; (2) Southeast and south to Bournemouth; (3) Southwest and south, excluding Bournemouth; (4) Midlands; (5) Lancashire, Cheshire and Wales (north); (6) Yorkshire and Lincolnshire; (7) Northern; (8) Scotland; (9) Wales (south). To assist the area sub-committees in carrying out their investigations there will be local advisory committees composed of representatives of the tramway undertakings in each area, who will consult with the area sub-committees.

When presiding at the conferences which have been held in the various areas, James Devonshire, chairman of the Board of Trade committee, said it was not the intention of the Board of Trade to control tramway undertakings, but to relieve them of as many of their difficulties and perplexities as possible. Each of the areas was to be in charge of an advisory committee elected by the undertakings themselves, and to have supervision over such questions as labor, rails, permanent way, rolling stock and car equipment, and priority for material.

On the question of more efficient car service, Mr. Devonshire suggested that local authorities should endeavor to arrange to have large employers of labor open at varying times, say, one at 6 a.m., another at 6.10, another at 6.20, and another at 6.30, instead of four at 6 o'clock. That system had been adopted around London with very good results.

Another way in which relief might be obtained was to ask ladies to do their shopping at times when the cars were not used by the workers. The chairman also dealt with the question of increased fares, rates for the conveyance of parcels and goods, the better utilization of cars in the distribution of food, the labor problem, and the transference of material and equipment.

He said it was possible that the Board of Trade would have to determine which undertakings should be wholly or partly discontinued in order that material might be transferred to other undertakings of greater importance. In regard to non-essential

routes the Ministry of Munitions had already made a complete survey of the tramways of the country, and if it became necessary to declare any non-essential he hoped the tramways owners would render assistance so as to avoid waste of time.

One of the functions of the advisory committee will be to advise as to the amount of compensation payable in respect of loss of revenue involved by reduction of service or closing of routes. For the advisory committee, he suggested the appointment of one member, perhaps the manager, of each tramway concern in the area.

For some time now the tube railways associated with the Underground Electric Railways, London, and the London General Omnibus Company, have been working together, and their receipts less working expenses, prior charges, reserves and other items, are pooled, and distributed in certain proportions. The five companies concerned are the Metropolitan District Railway, the Central London Railway, the City & South London Railway, the London Electric Railway, and the London General Omnibus Company.

#### HOW LONDON RAILWAY POOL WORKS

The gross receipts of the five undertakings were £6,661,000 for the past year, an increase of £623,000 over 1916. As the revenue liabilities were £610,000 higher, the increase in the common fund to be divided was £13,000, the amount of that fund being £520,337. Of this sum of £520,337 the London General Omnibus Company receives £166,508, the Central London £104,067, the Metropolitan District £62,440, the London Electric Railway £156,101, and the City & South London £31,220.

At the annual meeting of the London Electric Railway the chairman said the difficulties which the war had caused in connection with the operation of the railway had increased during the year. The amount of business done and the number of passengers carried by all of the underground railways had increased, due mainly to the limitation and alteration of services by the tramways and omnibus undertakings, particularly the latter, and to the abnormal conditions of London. Nearly one-half of the increase of £610,000 in the expenses of the common fund companies had been due to increased war bonus to the staff. The increase in gross receipts, while due mainly to the increase of passengers booked, had also been affected to some extent by the increased rates of fare put in effect on increased rates of fare put in effect in August, 1917.

The board in control of the London

**Over the Top to the Third Line Trenches!**

properties did not believe in high fares for an urban transportation service, such as that supplied by this group of companies, nor did it believe under ordinary circumstances that the way to increase revenue was to increase fares. The present conditions, however, were so abnormal and the purchasing power of money so reduced that the effect to the company had been the same as if the rates of fare had actually been decreased. On this account it was very probable that further increases of fare would have to be made. There was no intention, however, of increasing the rates above the level which might be necessary to maintain the position of the undertakings and to provide for the maintenance of the property, but in so far as required for this purpose fares would be readjusted.

#### EDINBURGH HAS TRYING YEAR

At the annual meeting of the Edinburgh & District Tramways the chairman said that in many respects the past year had been by far the most trying through which the company had gone. Never had the company been beset with such constant trouble through shortage of materials, government restrictions and difficulties in finding suitable employees. Until well on in the year, the company was in a serious condition, as the system was being operated at a loss. The company was forced to approach the Corporation of Edinburgh to assist it by reducing the rent, pointing out that the only alternative was an increase of fares. The corporation could not see its way to meet this request, and immediate steps were taken to abolish the 1½d. and 2½d. fares.

The chairman thought that the agreement entered into by the company with the corporation after protracted negotiations was the fairest that could have been arranged. It was quite impossible with the depleted staff to give adequate service on all routes. The increase of fares had produced satisfactory results, and the number of passengers carried showed a steady increase. During the year the company carried a total of 70,687,146 passengers, which meant, assuming the population of the city to be 320,000, that the lines had carried the entire population 220.9 times throughout the year.

The general manager of the Edinburgh & District Tramways has drawn attention to the difficulties with which the company is at present contending, and has given warning of the possibilities of serious interruption of the tramway service. He has pointed out that the company cannot get new cables, and that the limited quantity for which it has priority terms from the Ministry of Munitions is insufficient to keep the system going. In normal times the company had spare cables, but now it had none, and those in use had been so patched and spliced that they were not reliable. Representation of the urgent need for maintaining the efficiency of the tramway service will be made to the ministry. A. C. S.

# News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

## Electricity to Chestnut Hill

Service on Another Branch of Pennsylvania Railroad Established on April 1

Electric operation of the Germantown and Chestnut Hill Branch of the Pennsylvania Railroad from Broad Street Station, Philadelphia, to Chestnut Hill station, on the outskirts of the city, was commenced on April 1. This followed the electrification of the main-line suburban section from Philadelphia to Paoli two years ago.

Electrification of the Chestnut Hill branch was authorized by the directors of the company in 1913. The estimated cost at that time was \$1,250,000. Owing to war conditions, the commencement of the work was delayed until the fall of 1915, and many subsequent delays have been experienced through inability to obtain material and labor. The actual cost has been approximately \$1,500,000.

The first experimental train was operated on March 22. It consisted of three multiple-unit cars. The party that made the trip was composed of R. L. O'Donnel, assistant general manager, members of his staff and other operating and traffic officials.

Twenty-two multiple-unit cars are required in the operation of the service on the Germantown and Chestnut Hill branch, which carries a very heavy commutation traffic. The cars are of the standard suburban type adopted by the Pennsylvania Railroad, are of solid steel construction, and were built in the Pennsylvania Railroad shops at Altoona, Pa. They are equipped with Westinghouse motors, electrical apparatus and air brakes. Twenty-four trains are operated daily in each direction between Broad Street station and Chestnut Hill on weekdays and sixteen

on Sundays. There are ten stations on the branch, in addition to Broad Street station, West Philadelphia and North Philadelphia, which are main-line stations. The branch proper begins at North Philadelphia station.

In electrifying the Germantown and Chestnut Hill branch, 150 miles of wire was used, 232 poles were erected and twenty automatic block signal bridges constructed. At present trains are being operated on the steam schedule in use at the time the change was made. It is expected that ultimately the running time under electrical operation can be slightly reduced in both directions.

## New Cincinnati Lease Likely

Members of the Rapid Transit Commission of Cincinnati, Ohio, and the committee on street railroads of the Council met with Mayor Galvin on March 29 to discuss the reopening of

## Back those Bayonets with Bonds

negotiations with the Cincinnati Traction Company for a new rapid transit loop lease ordinance. This was made necessary by the fact that the Supreme Court of Ohio recently held that the provision in the original lease relating to the distribution of earnings was illegal.

Should the city and the company be able to agree upon the embodiment of the valid sections of the old ordinance into a new instrument, the disposition of the earnings will be the only question to determine. A 5-cent fare and universal transfers were provided in the original agreement. Mayor Galvin said that neither an increase in the rate of fare nor a departure from the custom of collecting a franchise tax would appeal to him.

## Senate Passes Railway Bill

Measure to Insure Transit to Shipbuilding Sites Amended and Sent to the House

The Senate has passed a measure introduced by Mr. Fletcher of the commerce committee, to amend the emergency shipping fund provisions of the present urgent deficiency act, the result of which is to empower the President and his designated agents—in this case the Shipping Board—to take over, if necessary or desirable, transportation systems for the transformation of shipyards and plant employees. The bill "empowers," but does not "require."

The amendment to the deficiency act makes Paragraph F read as follows:

To take possession of lease, or assume control of any street railroad, interurban railroad, or part thereof wherever operated, and all cars, appurtenances, and franchises or parts thereof commonly used in connection with the operation thereof necessary for the transfer and transportation of employees of shipyards or plants engaged or that may be hereafter engaged in the construction of ships or equipment therefor for the United States.

Section 3 of Paragraph F of the act was amended as follows:

Sec. 3. That upon taking possession of such property, or leasing or assuming control thereof, just compensation shall be made therefor to be determined by the President, and if the amount thereof so determined by the President is unsatisfactory to the person entitled to receive the same, such person shall be paid 75 per cent of the amount so determined by the President and shall be entitled to sue the United States of America to recover such further sums as added to 75 per cent will make up such amount as will be just compensation therefor, in the manner provided for by section 24, paragraph 20, and section 145 of the Judicial Code.

The President may exercise the power and authority hereby vested in him through the several departments of the government, and through such agency or agencies as he shall determine from time to time.

Senator Calder, who objected to the measure some weeks ago, said:

"The one danger, Mr. President, is that in case the Shipping Board are not exceedingly careful, they may have imposed upon them worthless railways at an exorbitant figure. I have had some doubt of the wisdom of the measure, but I do know that something must be done to relieve the situation in some of the out-of-the-way shipyards, which have been constructed during the past year or so. I have talked with the Shipping Board officials about the matter, and have expressed the hope to them that they will exercise the greatest possible care to avoid the danger of the government being imposed upon."

Senator Fletcher read a telegram from Admiral Bowles, for the Emergency Fleet Corporation, urging the passage of the bill.

The proposed amendments will now be laid before the House of Representatives.



FIRST ELECTRIC TRAIN TO CHESTNUT HILL



## National Labor Policy Recommended

### National Board to Act in All Labor Disputes Where Production Necessary to Conduct of War Is Concerned—Principles that Govern Relations Between Workers and Employers

The War Labor Conference Board appointed at the suggestion of Secretary of Labor Wilson to aid in the formation of a national labor program for the period of the war has made a report. The committee, whose appointment was mentioned in the *ELECTRIC RAILWAY JOURNAL* for Feb. 23, page 381, was made up of five employers, five labor men and two representatives of the public. L. A. Osborne and L. F. Loree, New York, were in the first group and Ex-President William H. Taft was one of the representatives of the public. The board recommends, among other things:

#### WAR LABOR BOARD TO BE CREATED

"That there be created, for the period of the war, a National War Labor Board of the same number and to be selected in the same manner and by the same agencies as the commission making this recommendation:

"That the functions and powers of the National Board shall be as follows:

"1. To bring about a settlement, by mediation and conciliation, of every controversy arising between employers and workers in the field of production necessary for the effective conduct of the war.

"2. To do the same thing in similar controversies in other fields of national activity, delays and observations which may, in the opinion of the National Board, detrimentally affect such production.

"3. To provide such machinery by direct appointment, or otherwise, for selection of committees or boards to sit in various parts of the country where controversies arise, to secure settlement by local mediation and conciliation.

"4. To summon the parties to the controversy for hearing and action by the National Board in case of failure to secure settlement by local mediation and conciliation.

"If the sincere and determined effort of the National Board shall fail to bring about a voluntary settlement, and the members of the board shall be unable unanimously to agree upon a decision, then and in that case and only as a last resort, an umpire appointed in the manner provided in the next paragraph shall hear and finally decide the controversy under simple rules of procedure prescribed by the National Board.

"The members of the National Board shall choose the umpire by unanimous vote. Failing such choice, the name of the umpire shall be drawn by lot from a list of ten suitable and disinterested persons to be nominated for the purpose by the President of the United States.

"The National Board shall refuse to take cognizance of a controversy between employer and workers in any field of industrial or other activity where

there is by agreement or federal law a means of settlement which has not been invoked.

"The action of the National Board may be invoked in respect to controversies within its jurisdiction, by the Secretary of Labor or by either side in a controversy or its duly authorized representative. The board, after summary consideration, may refuse further hearing if the case is not of such character or importance to justify it.

#### PRINCIPLES AND POLICIES TO GOVERN

"The Board in its mediating and conciliatory action, and the umpire in his consideration of a controversy, shall be governed by the following principles:

#### THERE SHOULD BE NO STRIKES OR LOCK-OUTS DURING THE WAR

##### *Right to Organize*

"1. The right of workers to organize in trade unions and to bargain collectively, through chosen representatives, is recognized and affirmed. This right shall not be denied, abridged or interfered with by the employers in any manner whatsoever.

"2. The right of employers to organize in associations of groups and to bargain collectively, through chosen representatives, is recognized and affirmed. This right shall not be denied, abridged or interfered with by the workers in any manner whatsoever.

"3. Employers should not discharge workers for membership in trade unions, nor for legitimate trade union activities.

"4. The workers, in the exercise of their right to organize, shall not use coercive measures of any kind to induce persons to join their organizations, nor to induce employers to bargain or deal therewith.

##### *Existing Conditions*

"1. In establishments where the union shop exists the same shall continue and the union standards as to wages, hours of labor and other conditions of employment shall be maintained.

"2. In establishments where union and non-union men and women now work together, and the employer meets only with employees or representatives engaged in said establishments, the continuance of such condition shall not be deemed a grievance. This declaration, however, is not intended in any manner to deny the right, or discourage the practice of the formation of labor unions, or the joining of the same by the workers in said establishments, as guaranteed in the last paragraph, nor to prevent the War Labor Board from urging, or any umpire from granting, under the machinery herein provided, improvement of their situation in the matter of wages, hours of labor, or other conditions, as shall be found desirable from time to time.

"3. Established safeguards and regulations for the protection of the health and safety of workers shall not be relaxed.

##### *Women in Industry*

"If it shall become necessary to employ women on work ordinarily performed by men, they must be allowed equal pay for equal work and must not be allotted tasks disproportionate to their strength.

##### *Hours of Labor*

"The basic eight-hour day is recognized as applying in all cases in which existing law requires it. In all other cases the question of hours of labor shall be settled with due regard to governmental necessities and the welfare, health and proper comfort of the workers.

##### *Maximum Production*

"The maximum production of all war industries should be maintained and methods of work and operation on the part of employers or workers which operate to delay or limit production, or which have a tendency to increase the cost thereof artificially, should be discouraged.

##### *Mobilization of Labor*

"For the purpose of mobilizing the labor supply with a view to its rapid and effective distribution, a permanent list of the number of skilled and other workers available in different parts of the nation shall be kept on file by the Department of Labor, the information to be constantly furnished: (1) By the trade unions; (2) by state employment bureaus and federal agencies of like character; (3) by the managers and operators of industrial establishments throughout the country. These agencies should be given opportunity to aid in the distribution of labor, as necessity demands.

##### *Custom of Localities*

"In fixing wages, hours and conditions of labor regard should always be had to the labor standards, wage scales, and other conditions, prevailing in the localities affected.

##### *The Living Wage*

"1. The right of all workers, including common laborers, to a living wage is hereby declared.

"2. In fixing wages, minimum rates of pay shall be established which will insure the subsistence of the worker and his family in health and reasonable comfort."

#### Final Philadelphia Hearing

The Public Service Commission of Pennsylvania on March 27 opened the hearing on the proposed lease of the Philadelphia high-speed transit facilities to the Philadelphia Rapid Transit Company. Mayor Smith representing the city was the first to take the stand. He presented the proposed contract and stated that he believed the agreement represented as fair and equitable a



business understanding as is possible to draft.

The Mayor was succeeded by William Draper Lewis, his counsel, representing the transit department of the city, who proceeded to discuss for the commission the meaning and intent of the contract, article by article.

The present hearing before the commission is the last move looking toward the validation of the agreement. Both branches of Councils passed the ordinance some time ago and it was promptly signed by the Mayor. The agreement was then approved by the stockholders and the directors of the company.

### When Is Steel Not Steel?

Chairman Straus of the New York Public Service Commission Answers: "When It Is Agasote"

New York's new Mayor, John F. Hylan, continues on his discovery-making way. First he discovered the Brooklyn Rapid Transit; then he discovered the Public Service Commission, including Commissioners Straus and Whitney, with whom he had an animated correspondence; then he discovered Palm Beach and Mr. Hearst; then he came back to New York and discovered that the municipal employees, who of course couldn't go to Palm Beach, could loaf pretty near as well in New York, and now he has discovered the use of pasteboard trimmings in some supposedly all-steel cars in the Fourth Avenue Subway. Anent his latest discovery the Mayor wrote to Chairman Straus of the Public Service Commission:

"I wish you would examine the inclosed strip of interior finish and decoration of the steel cars of the Fourth Avenue Subway and let me know what you have to say about these cars being partly made of paper or pasteboard and not all steel, as the public are led to believe they are. The inclosure may be a new species of Public Service steel which I am not familiar with."

Said Mr. Straus to the Mayor:

"The term 'all-steel car' or 'car of all steel construction' as understood by all those who know anything about the subject, does not imply that all the materials in the car are of steel. To-day 85 per cent of the steel cars operating on the trunk lines in the United States are either partially or wholly lined with heat insulating material of the same or similar manufacture as the sample you have sent me.

"This particular material is known as 'Agasote,' and is not used as an interior lining for the purpose of reinforcing or adding strength to the car structure. The strength of the car is obtained by the steel frame, wall and roof, thus constituting an all-steel car from a construction standpoint, and the car is then lined with a material such as above stated, and which renders it less pervious to moisture, etc. I am sure you can find confirmation of these facts by consulting any expert upon 'all-steel car construction.'"

## Kansas City Strike Settled

### Sympathetic Strike That Set the Whole Nation to Talking Extended to Kansas City Railways, but Service Was Quickly Restored Under Protection

The Kansas City (Mo.) Railways had to suspend service on March 28 although the employees of the company, who are members of the union, had voted not to join the sympathetic strike in progress in that city. It was understood also that instructions had come from the headquarters of the national organization that the Kansas City men should not join the sympathetic movement.

The sympathetic strike was settled on the night of April 2. The workers returned to work under the former contracts. Many of those engaged in the building trades, however, were still out at that time, pending the adjustment of questions that were under discussion previous to the general strike. The order of the Kansas City Railways that the men should not display the union buttons caused a delay of an hour on April 3 in the full resumption of service, but the new agreement permits the men to wear the buttons, the union agreeing not to discriminate against trainmen without buttons. The agreement also provides that all differences shall be submitted to arbitration and that even at the renewal of the annual agreement, which expires in August, there shall be no strike. W. D. Mahon, international president of the Amalgamated Association, signed for the carmen.

At noon on March 28, despite the previous announcements of the president of the local car men's union that the men would not quit work, persons claiming to represent the sympathetic strikers announced that the cars would be stopped. During the afternoon the cars were brought into the carhouses and by evening no cars were running in Kansas City, Mo. Cars ran between Kansas City, Kan., and the downtown district of Kansas City, Mo., until eight o'clock.

Mr. Kealy the afternoon of March 28 issued a statement to employees which was published in display space on Friday morning. In this statement Mr. Kealy said:

"Those of you who are willing to return to your work are asked to report at once. You will be protected. You will earn the thanks of a public outraged by this blow at a service so necessary to its comfort and convenience. You have been forced out of work and your contract broken by these men. Isn't it time to stand for ourselves and our city against outside interference? We urge all to return to work."

President Kealy also sent to W. D. Mahon, international president of the Amalgamated Association of Street & Electric Railway Employees, a telegram

**You Don't Need a Bank Account to Buy LIBERTY BONDS**

notifying him that the Kansas City local had broken its contract.

Very few of the trainmen seemed to know when the orders to quit had come. They merely knew that their committee men had transmitted the order to them.

Meanwhile the police had taken a more vigorous hold of the situation and arrangements were made for the guard to help in the protection of street railway property and for policemen to ride on cars with the trainmen. On the afternoon of March 29 twenty-five cars, the maximum for which police guards were provided, started out. On the morning of March 30 the National Guard provided more help, and with an increased number of policemen, the railway was enabled during the day to operate about half of its normal number of cars.

The union employees who returned to run the cars continued to wear their union buttons. The number of men who returned was about equally divided between members of the union and non-members.

Last fall, when the men on the railway struck, an agreement was reached under which differences between the company and men were to be settled by arbitration. This agreement was between the company and an accredited committee of employees; the agreement itself made no mention of unions, or of the Amalgamated Association of Street & Electric Railway Employees. It was signed by E. F. Michael and several other employees. After its signing, a representative of the national order is said to have expressed his appreciation of the manner in which the company had met the men, and declared that he wanted to indicate the willingness of the national union to back up the agreement of the employees. At his request, therefore, he was allowed to indorse the agreement.

As stated previously the attention of President Mahon of the Amalgamated was called to the fact that this contract had been broken. He responded that this was true, but that the situation was peculiar. He was not ready to order the men back to work, alleging, it is said, that by so doing he would cause the railway men to abandon their fellow union workers in the midst of battle.

### Toledo Results on April 10

At a meeting in the office of Mayor Cornell Schreiber on April 10, Federal Mediator Faulkner will announce the results of the examination of the books of the Toledo Railways & Light Company and the Toledo Traction, Light & Power Company, Toledo, Ohio, and explain their relation to the demand of the car men and electrical workers in the employ of the company for an increase in wages.

## St. Louis Measure Passed

### Ordinance for Settlement of Differences Between City and United Railways Before Mayor for Signature

The Board of Aldermen of St. Louis, Mo., on March 22 adopted the amendments suggested by the Board of Public Service to the proposed United Railways settlement ordinance.

#### SUMMARY OF PROVISION OF MEASURE

The adoption of the amendments means that:

1. The mill tax and franchise tax will be eliminated, and the United Railways will be required to pay to the city, in lieu thereof, one-half of 1 per cent of its gross receipts annually. This tax later may be increased not to exceed 3 per cent of the company's gross annual receipts.

2. The franchises of the United Railways subsidiaries will be validated and extended until 1948.

3. The United Railways will be permitted to earn for the present not to exceed 6 per cent annually on a valuation of \$60,000,000, and 7 per cent on money put into the property hereafter.

4. The temporary valuation of \$60,000,000 is fixed on the company's holdings as a basis of its earning power, with a proviso that the physical valuation of the properties made by the Missouri Public Service Commission within two years shall be substituted for the temporary valuation.

5. The company will be permitted to pay the accrued mill tax of \$2,300,000 to the city in ten annual installments, without interest.

6. The fare must remain at 5 cents, and universal transfers must be given, until the jurisdiction of the Missouri Public Service Commission to make a change is established and the commission has legally ordered a change.

7. The company must reorganize and accept the terms of the ordinance within twelve months, or within six months after peace is declared in the European war.

Two amendments submitted by President Aloe of the Aldermen were adopted. They require the United Railways to install a bookkeeping system in accordance with the orders of the Missouri Public Service Commission, and authorize the Judges of the Circuit Court to appoint the third member of the Board of Control to settle mooted problems if the St. Louis Court of Appeals fails to do so.

#### MEASURE UP TO MAYOR AND COMPANY

Subsequently the Board of Public Service approved the settlement ordinance as amended by the Board of Aldermen and adopted a report recommending its passage.

On March 29 the Board of Aldermen passed the settlement bill and Mayor Kiel may affix his signature after ten days or by April 8.

## Liberty Bonds Speak Louder than Words

The Mayor has said that he will sign the measure, as he has studied its terms as the ordinance was developed and approves it.

The ordinance will not become effective, however, unless the United Railways accepts it and formally notifies the city of such acceptance within twelve months, or in the event the war with Germany continues beyond that, within six months after the war is over.

## News Notes

### Minneapolis Investigation Continued.

—Congressman C. C. Vandyke, labor leader, is investigating the labor situation on the lines of the Twin City Rapid Transit Company, Minneapolis, Minn., but has not yet reported. He is said to represent President Wilson in a further consideration of the railway company's attitude toward taking back former strikers.

**Wage Advance in Sherman.**—The Texas Electric Railway on April 1 advanced the wages of trainmen employed on the local lines in Sherman and the men on the interurban lines out of that city. Hereafter the wages will be from 24 cents to 30 cents an hour, depending on the length of service. This is an advance of 2 cents an hour over the former schedule.

**Local Transportation Bill Passed by House.**—The bill authorizing the expenditure of \$50,000,000 through the Secretary of Labor for the purpose of providing housing, local transportation and other facilities for war needs, known as the Clark bill, has been passed by the House. An editorial discussing some features of this bill and put to press before its passage by the House appears elsewhere in this issue. This measure was also referred to in the ELECTRIC RAILWAY JOURNAL for March 9, page 471.

## Programs of Meetings

### National Lumber Manufacturers' Association

The postponement to a date in May of the sixteenth annual meeting of the National Lumber Manufacturers' Association, originally scheduled for April 8-9, has been announced. Last week in Washington, prominent lumbermen were asked to return to that city for a conference early in April on an important government matter. As there was a conflict in dates the executive committee of the National Association felt there was only one thing to do, and hence the annual meeting will be held some time in May, the exact dates to be announced.

### United States Chamber of Commerce

On April 10, 11 and 12 the sixth annual meeting of the United States Chamber of Commerce will be held at the Auditorium, Chicago. There will be four chief objective points: (1) financing the war; (2) railroads and highway transportation; (3) ships and shipping; (4) organized control of industry. Prominent among those who will deliver addresses are: The Earl of Reading; Secretary of the Navy Daniels; Secretary of the Interior Lane; Alva B. Johnson, president of the Baldwin Locomotive Works; John F. Wallace, chairman of the Chicago Terminal Commission; T. N. Vail, president of the American Telephone & Telegraph Company, New York; Thomas N. McCarter, president of the Public Service Corporation, Newark, N. J., and Philip H. Gadsden, who is in charge of the work of the War Board of the American Electric Railway Association.

Although the annual meeting will not open until Wednesday morning, a number of committee reports will be read on Tuesday afternoon at the meeting of the National Councillors in the Congress Hotel. At the meeting on Wednesday morning the delegates will be welcomed, President Rhett will address those in attendance and the committees will be announced. In the afternoon high government officials will outline the government's position in regard to (1) government organization in relation to war; (2) railroads; (3) finance; (4) shipping. The National Chamber's activities in relation to the foregoing will also be presented in ten-minute addresses by different speakers.

On Thursday discussions will be held in group sessions on the subjects suggested in Wednesday afternoon and evening. One group will discuss government organization in relation to business in war. Finance will be taken up by the group under the leadership of Charles A. Hinsch, president of the American Bankers' Association. The discussion will be divided between trade acceptances and the effect of government financing on industry. Thomas N. McCarter and David Forgan, president of the National City Bank, Chicago, Ill., will be the speakers on the effect of government financing on industry. The group discussion of railroads and highway transportation will be under the leadership of Harry A. Wheeler. President Johnson of the Baldwin Locomotive Works will speak on motor power, and John F. Wallace will discuss terminals. Mr. Gadsden will outline some of the difficulties which confront the electric railways as a result of the war. On Friday morning, following the election of officers and a report of the committee on resolutions, there will be a general discussion leading to action upon the resolutions presented.

## A Better Investment Than a Liberty Bond—Two Liberty Bonds

# Financial and Corporate

## Piedmont Earnings Gain

1916 Returns of Piedmont & Northern Line Show Net Increase of 30 Per Cent

According to the 1916 report of the Piedmont & Northern Railway, Charlotte, N. C., just now available, the company during that calendar year showed marked increases in operating results. The operating revenues,

The property will most likely be bought in by a reorganization committee formed by the bondholders. This committee plans to organize a new company to be bonded for approximately \$5,500,000, of which some \$2,000,000 will bear interest from July 1, 1917, \$350,000 from July 1, 1919, \$1,275,000 from July 1, 1922, and \$1,275,000 from July 1, 1927.

In 1915 gross earnings were \$801,478;

been operated by John P. Coghlan, a San Francisco attorney, as receiver. The receiver has put all the earnings back into the property and now reports that he is prepared to turn the system over to the reorganized company in excellent condition. Betterments made under the receiver include a number of grain, rice and bean warehouses, spurs into new industries, new freight equipment, and additions to the motive power.

In 1917 the Western Pacific Railroad made an offer of \$3,682,000 for the system. This was refused by the reorganization committee. That this offer had been made was disclosed during the foreclosure proceedings.

INCOME STATEMENT OF PIEDMONT & NORTHERN RAILWAY

	1916		1915	
	Amount	Per Cent.	Amount	Per Cent
Passenger revenue.....	\$401,293	32.8	\$341,877	33.8
Freight revenue.....	750,988	61.3	610,803	60.4
Miscellaneous revenue.....	71,878	5.9	57,868	5.8
Total operating revenue.....	\$1,224,159	100.0	\$1,010,547	100.0
Way and structures.....	\$76,344	6.2	\$66,434	6.6
Equipment.....	58,658	4.8	50,985	5.0
Power.....	129,047	10.5	129,049	12.8
Transportation.....	170,722	13.9	158,320	15.7
Traffic.....	28,811	2.4	22,711	12.2
General.....	193,135	15.8	147,374	14.6
Total operating expenses.....	\$656,717	53.6	\$574,873	56.9
Net operating revenue.....	\$567,442	46.4	\$435,674	43.1
Taxes.....	48,847	3.9	37,388	3.7
Operating income.....	\$518,595	42.5	\$398,287	39.4
Non-operating income.....	9,653	0.8	11,073	1.1
Gross income.....	\$528,248	43.3	\$409,360	40.5
Interest on funded debt.....	\$316,746	25.9	\$316,710	31.3
Other interest.....	27,901	2.3	28,860	2.9
Miscellaneous debts.....	1,376	0.1	1,179	0.1
Total deductions.....	\$346,023	28.3	\$346,749	34.3
Net income.....	\$182,224	15.0	\$62,611	6.2

as shown in the accompanying table, increased \$213,612 or 21 per cent. The operating expenses rose \$81,844 or 14 per cent, with the result that the net operating revenue showed a gain of \$131,768 or 30 per cent. The net income for the year was \$182,224 as compared to \$62,611 in 1915.

in 1916 they were \$870,492, and in 1917 they were \$1,000,792. The net earnings in 1915 were approximately \$150,000; in 1916, \$170,000, and in 1917, \$200,000. Earnings for 1918 to date show a substantial increase over 1917.

It was shown during the foreclosure proceedings that the Northern Elec-

Calendar Years	Gross Revenue	Operating Income	Operating Ratio (Taxes Included)	Average Miles Operated	Gross Revenue per Mile of Road	Operating Expense per Mile of Road	Operating Income per Mile of Road
1916.....	\$1,224,159	\$518,595	57.6	127.4	\$9,608	\$5,538	\$4,070
1915.....	1,010,547	398,287	60.6	124.7	8,103	4,909	3,193
1914.....	949,914	324,344	65.8	121.0	7,850	5,170	2,680
1913.....	659,552	257,384	60.9	95.5	6,906	4,211	2,695
1912.....	160,345	53,596	53.6	42.9	3,737	2,488	1,249

The total number of passengers carried was 1,467,358 in 1916, as compared to 1,221,284 in 1915. The revenue tons of freight in 1916 totaled 717,296 and in 1915 572,809. The gross revenue per mile of road was \$9,609 in 1916 and \$8,104 in 1915. Further comparative statistics are reproduced above.

## Northern Electric Ordered Sold

The Northern Electric Railway, which operates in the Sacramento Valley in California, between Chico and Woodland, has been ordered sold in foreclosure proceedings in the United States District Court, San Francisco. The date of sale will probably be fixed between May 15 and June 1.

tric System represented a book investment in excess of \$12,000,000, and that the California Railroad Commission had fixed its reproduction cost, less depreciation, at approximately \$10,000,000.

The system, which includes a belt freight line around the city of Sacramento, is 215 miles in length, is operated by a third-rail, and has connecting tracks at various points with the Southern Pacific and Western Pacific Railroads, and through the Central California Traction Company and Oakland, Antioch & Eastern Railway with the Santa Fé System. Its principal freight business is in grain, rice, beans, fruit and other farm products.

Since Oct. 5, 1914, the system has

## Agree on War Finance Bill

The conference agreement on the war finance corporation bill as presented to Congress was adopted in the Senate on April 1. This is regarded as representing the bill as it will finally pass Congress, for the House is expected to agree to the conference report.

According to the report, the corporation, as soon as the bill becomes a law, will be allowed to issue a total of \$3,000,000,000 in bonds instead of the \$4,000,000,000 provided for in the Senate bill and instead of the \$2,000,000,000 provided for in the House bill.

The conference report provides that the security to be required for advances shall be 125 per cent, the adequacy of the 125 per cent security on the loan to be determined by the capital issues committee. The conferees agreed that the capital issues committee shall be composed of seven members to be appointed by the President, by and with the advice and consent of the Senate. The conferees refused to agree to the House idea that not more than four members of the same political party shall be members of the capital issues committee.

## \$500,000 of Bonds Authorized

The California Railroad Commission has authorized the Tidewater Southern Railway, Stockton, Cal., to issue \$500,000 of first mortgage 5 per cent bonds, payable in 1942, to be sold at not less than 80 per cent of face value, and the proceeds to pay in part for the completion of its present operated line of railroad from Stockton to Turlock and Hilmar, to finish a branch from a station on its main line at Small to Manteca, and to extend its main line from Hilmar to Stevenson.

The company is operating from Stockton to Modesto by way of Escalon, about 33 miles, a branch line from Small, 8 miles; from Stockton to Manteca, 3½ miles, and also the main line from Modesto to Hilmar, a distance of 17 miles, and a branch from Hatch to Turlock, 6 miles. The work still to be done consists of grading, ballasting, fencing, laying rails, etc.

The Western Pacific Railroad controls the Tidewater company through stock ownership. It has agreed to buy the \$500,000 of bonds at 80 per cent.

## Tax Question Up Soon

Chairman of House Ways and Means Committee Says Congress Must Consider Further Taxation

Representative Kitchin, chairman of the House ways and means committee, during a debate in the House of Representatives, announced that Congress must soon consider whether further taxes are to be imposed in the near future or heavy taxation and big bond issues resorted to for several years after the war to produce revenue.

The ways and means committee is charged by statute with the duty of initiating revenue producing legislation, and Mr. Kitchin was asked by members of the House when Congress will begin to tax those who are making profits out of the war and arrange to impose less taxation upon the next generation. Mr. Kitchin said he believed taxes should be increased 25 per cent, and that in any case heavy taxation and big bond issues may be expected for several years after the war, as was the case after the Civil War.

Revenue officials in Washington are stating informally that they believe the income taxes and the excess profits taxes will greatly exceed the estimated

## We're in It—Let's Win It BUY LIBERTY BONDS

figures of return. These estimates are as follows: From excess profits \$1,226,000,000; from corporation incomes, \$535,000,000; and from individual incomes, \$666,000,000.

## Northern Texas Earnings in 1917

The report of the Northern Texas Traction Company for the calendar year 1917 has been filed with the City Commission of Dallas, Tex., and has been formally approved by that body. The report shows a gross income of \$2,389,242 and expenditures of \$1,802,730, leaving a net of \$586,512. The revenue from passengers amounted to the sum of \$2,245,901.

## Frontier Purchase Allowed

The Public Service Commission for the Second District of New York has granted the petition of the Pennsylvania Railroad and the Delaware, Lackawanna & Western Railroad to acquire jointly the capital stock of the Frontier Electric Railway. The order granted provides that the companies shall acquire the outstanding capital stock, \$25,000 at par, with the provision that the two roads shall not ask for an increase in the capital stock or issue any bonds of the Frontier company under the authority conferred in an order entered on Dec. 5, 1906, and that the companies shall submit to authority of the commission as to any issue of stock or bonds which may hereafter be required for construction. The companies are to comply with the provisions of the company's order within thirty days.

The Frontier company was incorporated in August, 1906, to operate an electric road from Buffalo to Niagara Falls, a distance of 75 miles. The periods within which the company was required to begin and complete construction have been extended several

## BUY LIBERTY BONDS Buy—BUY—BUY—till it hurts!

times by statute and by the force of such statutes have not yet expired. The company is alive and has the requisite legal capacity to carry out the purpose of its incorporation. Financially the company has never yet been able to fulfill the object of its existence.

## Selma Road Sold Under Foreclosure

The property of the Selma Street & Suburban Railway, Selma, Ala., has been sold under foreclosure by L. L. Gerould, trustee, to S. G. Adams, and by him has been reconveyed to the Selma Traction Company, a new company organized for the purpose of operating the property. The purchase price was \$50,000, the amount of the first mortgage bonds, which are owned by Mrs. F. M. Abbott, wife of Colonel F. M. Abbott, founder of the road, and Mrs. C. L. Waters, his sister.

The majority of the stock of the Selma Traction Company is owned by J. D. Woodard, Warren, Pa. The new company will issue first mortgage bonds for \$50,000 which will be taken and held by Mrs. Abbott and Mrs. Waters. Hugh Mallory, attorney for the company, made the following statement after the sale:

"Mr. Woodard has had considerable experience in the railway business. He will extend the lines toward the property of the Selma Manufacturing Company. Another improvement which he fully expects to make, and which, with the proper co-operation on the part of the public, he will undoubtedly make is to extend the line to the Municipal swimming pool."

## New Tax for Jersey Railways

Under a bill which has just been signed by Governor Edge of New Jersey, a tax at the average tax rate of the State on the gross receipts of electric railways, gas and electric utilities is

## Lend Him a Hand—BUY LIBERTY BONDS

substituted for the personal property tax on the property of such corporations. The new tax does not affect the franchise tax or the tax on real property.

Under the existing law every electric railway of New Jersey is now subject to a franchise tax of 5 per cent on the gross receipts. The new law provides that in addition to this fran-

chise tax there shall be placed on the gross receipts an annual tax at the average rate of taxation in the State as computed by the State Board of Taxes and Assessments. This additional tax is to be levied upon the same gross receipts upon which the franchise tax is levied, and it is to be imposed in lieu of all State, county, school and local taxation of personal property, including machinery, apparatus and equipment held by the corporations. The act takes effect on Oct. 1, 1918, but it is provided that its clauses shall not be applicable to taxes which are assessed for 1918.

## Washington Unification

Committees Appointed from Two Local Railway Companies at Capital to Consider Closer Co-operation

The movement toward the unification of the railway systems in the District of Columbia has been accelerated by the appointment of committees from both the Washington Railway & Electric Company and the Capital Traction Company to confer with a view of devising a plan of closer co-operation or unified or single management to be submitted to the Public Utilities Com-

## Money means Munitions—BUY LIBERTY BONDS

mission of the District and to the boards of directors of the respective companies as promptly as possible. The committee for the Washington Railway & Electric Company is composed of directors M. E. Ailes, George Truesdell and W. F. Ham, and that for the Capital Traction Company of directors George E. Hamilton, John H. Hanna and Benjamin W. Guy.

The resolution of the directors of the Washington Railway & Electric Company appointing the committee expresses the opinion that more efficient service could be rendered the public by the company if, with the approval of the Public Utilities Commission of the District, some plan of close co-operation, unified operation or single management could be effected between that company and the Capital Traction Company. The resolution of the Capital Traction Company is along the same general lines.

This effort by the companies toward unified operation is an indirect outcome of the inquiry of the Public Utilities Commission into the railway service in Washington. At one of the recent hearings before the commission, representatives of the Washington Railway & Electric Company said that the proper development of the public utility facilities of the District depended upon two things: first, the authorization by Congress of a comprehensive and reasonable plan of financing, and, second, the consolidation of the two principal electric railway systems operating in the District. Officers of the company also said that to the above should also be added a higher rate of fare.



## Financial News Notes

**Mr. Bernd a Director.**—At the annual meeting of the Des Moines (Ia.) City Railway and the Inter Urban Railway, held on March 20, O. G. Bernd, auditor, was elected to the directorates of these companies. Mr. Bernd succeeds E. P. Smith.

**Receiver's Certificates Authorized.**—W. E. Glasscock, receiver of the Morgantown & Wheeling Railway, Morgantown, W. Va., has been authorized by the court to issue 60,000 of receiver's certificates on account of repairs and betterments.

**Sale Under Foreclosure Postponed.**—The sale of the property of the St. Joseph Valley Railway, Elkhart, Ind., under foreclosure, which was set for March 20, has been postponed until April 8. The company operates 8 miles of line.

**Short Iowa Road Would Quit.**—The Sioux City, Crystal Lake & Home Electric Railway, Sioux City, Iowa, has applied to the Railroad Commission of Iowa for permission to abandon its 4 miles of line between South Sioux City and the park on Crystal Lake.

**Extra Common Dividend.**—The directors of the Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., have declared an extra dividend of 2 per cent on the common stock, payable on April 15 to stock of record of March 30.

**Will Not Abandon Operation.**—The Exeter, Hampton & Amesbury Street Railway, Exeter, N. H., brands as erroneous the statement made in the daily press recently to the effect that the company is to abandon its right-of-way and junk the property.

**No Common Stock Dividend.**—In view of the increased operating costs of the past winter and in order to conserve cash resources in the interest of essential construction, the board of directors of the Northern States Power Company, Chicago, Ill., has decided not to declare a dividend on the common stock at this time. Dividends have been paid on the common stock since July, 1916. The regular quarterly dividend of 1½ per cent has been declared on the preferred stock, payable on April 20. Dividends on the preferred stock have been paid continuously since the organization of the company in 1910. The net earnings after the payment of fixed charges for the year 1917 were 1.83 times the preferred stock dividend requirements.

**Action to Collect Seattle Tax.**—The city of Seattle, Wash., on March 23 brought suit in the King County Superior Court to recover from the Puget Sound Traction, Light & Power Company the sum of \$72,443, representing 2 per cent of the gross earnings of the company in 1917, which the company is obligated to pay the city under the terms of its franchises. More than two years ago, the company petitioned the Public Service Commission to be relieved of this obligation, and the matter is now in the Supreme Court awaiting final decision. The city obtained a judgment of \$64,387, representing 2 per cent of the earnings for 1916. The company appealed to the Supreme

Court, where the case will be argued in the near future.

**Sale at Auction on April 22.**—The property of the Ware & Brookfield Street Railway, Ware, Mass., will be offered for sale at foreclosure on April 22 by the American Trust Company, Boston, Mass., trustee, under a mortgage securing \$135,000 of 5 per cent bonds authorized in 1901 by the Hampshire & Worcester Street Railway. The Ware & Brookfield Street Railway abandoned operation on Feb. 3. The road was organized in 1900 as the Hampshire & Worcester Street Railway. It went into the hands of a receiver in 1905 and was sold under the decree of the court to the present owners. No dividends have ever been paid and the bond interest has not been met since the reorganization. The affairs of the company were reviewed briefly in the ELECTRIC RAILWAY JOURNAL for Feb. 16, page 336.

**Confirmation of Sale Put Off.**—Action in regard to confirming the sale under foreclosure of part of the Dan Patch line, the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn., has been postponed in the federal court to April 6. A reorganization is being attempted to save the line from Auto Junction to the Luce or Electric Short Line Junction from being scrapped. For this purpose protective association has been formed among the citizens along the line and they have agreed to indemnify the present owners against any loss that may be caused to them by the delay in case the attempt fails that is now being made by the local interests to reclaim the road. The part of the road previously mentioned was sold on Dec. 18 to representatives of the committee acting for the bondholders.

## Electric Railway Monthly Earnings

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.						INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.					
Period	Revenue Operating	Expenses Operating	Income Operating	Charges Fixed	Income Net	Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan., '18	\$77,776	\$50,169	\$27,607	\$19,659	\$7,948	1m., Feb., '18	\$3,256,310	\$1,812,533	\$1,443,777	\$1,171,141	\$262,636
1m., Jan., '17	74,684	*42,912	31,772	18,725	13,047	1m., Feb., '17	3,240,154	*1,645,070	1,595,084	1,006,995	\$588,089
12m., Jan., '18	889,212	*509,310	379,902	229,376	150,526	8m., Feb., '18	26,494,347	*14,871,566	11,622,781	8,823,332	\$2,800,449
12m., Jan., '17	838,388	*469,141	369,247	215,924	153,323	8m., Feb., '17	25,893,871	*12,530,598	13,363,273	7,985,983	\$5,377,290
CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.						LEWISTON, AUGUSTA & WATERTOWN STREET RAILWAY, LEWISTON, ME.					
1m., Jan., '18	\$133,002	*\$110,805	\$22,197	30,698	†\$8,501	1m., Jan., '18	\$47,120	*\$73,004	†\$25,884	\$15,911	†\$41,795
1m., Jan., '17	107,049	*75,444	31,605	32,660	†1,055	1m., Jan., '17	61,703	*54,188	7,515	15,308	†7,793
12m., Jan., '18	1,384,980	*1,174,262	210,718	360,510	†149,792	12m., Jan., '18	883,790	*702,500	181,290	187,292	†6,002
12m., Jan., '17	1,241,252	*835,578	405,674	360,129	45,545	12m., Jan., '17	812,480	*567,134	245,346	187,118	58,228
COLUMBUS RAILWAY POWER & LIGHT COMPANY, COLUMBUS, OHIO						NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.					
1m., Jan., '18	\$367,662	*\$301,949	\$65,713	\$52,744	\$12,969	1m., Jan., '18	\$204,521	*\$131,562	\$72,959	\$41,037	\$31,922
1m., Jan., '17	337,571	*228,524	109,047	44,269	64,778	1m., Jan., '17	209,869	*133,275	76,594	41,238	35,356
12m., Jan., '18	4,054,277	*3,017,355	1,036,922	567,063	469,859	12m., Jan., '18	2,452,973	*1,587,706	865,267	489,869	375,398
12m., Jan., '17	3,577,554	*2,160,729	1,416,825	519,521	897,304	12m., Jan., '17	2,396,326	*1,470,109	926,217	507,127	419,090
COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.						NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO					
1m., Jan., '18	\$1,700,470	*\$1,310,849	\$389,621	\$475,933	†\$86,312	1m., Feb., '18	\$526,542	\$356,184	\$170,358	\$92,282	\$78,076
1m., Jan., '17	1,617,719	*931,056	686,663	430,359	256,304	1m., Feb., '17	477,004	297,208	179,796	82,680	97,116
12m., Jan., '18	19,806,488	*12,664,798	7,141,690	5,334,681	1,807,009	2m., Feb., '18	1,068,843	727,043	341,801	186,947	154,854
12m., Jan., '17	17,172,773	*9,480,594	7,692,179	5,053,816	2,638,363	2m., Feb., '17	967,385	580,050	387,334	166,687	220,646
EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.						NEW YORK (N. Y.) RAILWAYS					
1m., Jan., '18	\$299,688	*\$263,009	\$36,679	\$65,730	†\$29,051	1m., Jan., '18	\$865,377	*\$720,601	\$144,776	287,627	†\$92,933
1m., Jan., '17	292,607	*194,800	97,807	64,065	33,742	1m., Jan., '17	997,075	*\$79,132	117,943	281,486	†118,821
12m., Jan., '18	3,699,552	*2,549,728	1,149,824	787,047	362,777	7m., Jan., '18	7,171,482	*5,418,664	1,752,818	1,978,796	†132,634
12m., Jan., '17	3,090,938	*1,877,592	1,213,346	757,245	456,101	7m., Jan., '17	6,390,636	*5,065,026	1,325,610	1,971,945	421,684
GRAND RAPIDS (MICH.) RAILWAY						PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.					
1m., Jan., '18	\$107,648	*\$79,155	\$28,493	\$20,444	\$8,049	1m., Dec., '17	\$594,020	*\$339,178	\$254,842	\$179,036	\$75,806
1m., Jan., '17	113,108	*74,464	38,644	18,051	20,593	1m., Dec., '16	512,594	*257,702	254,892	183,084	71,808
12m., Jan., '18	1,298,400	*914,867	383,533	220,608	162,925	12m., Dec., '17	6,023,510	*3,576,593	2,446,917	2,152,052	294,865
12m., Jan., '17	1,304,878	*837,827	467,051	190,436	276,615	12m., Dec., '16	5,483,110	*3,038,254	2,444,856	2,178,258	266,598

\* Includes taxes. † Deficit. ‡ Includes non-operating income. § Includes accruals under rapid transit contracts with city payable from future earnings.



# Traffic and Transportation

## New Bay State Fares

**Rate Has Been Filed Calling for Short Six-Cent Initial Zone with Eight Cents Outside**

A new schedule of fares has been filed with the Public Service Commission of Massachusetts by Receiver Wallace B. Donham of the Bay State Railway, covering city and suburban fares, and linking up the cities and country on the zone system. This schedule will go into effect on April 26. City patrons will pay 6 cents within a new city zone, which covers about a 3-mile area in the middle of each city. For those riding beyond the city zone into the fringe adjacent the fare will be 7½ cents, in tickets of six for 45 cents, and beyond this territory, in the country section, will be from 2 cents to 3 cents a mile, depending on the density of traffic. Mr. Donham says:

"The financial condition which brought about the receivership is even worse now than it was when the receiver was appointed.

"The amount of money paid to the men has recently been increased substantially and, under the contract, will be increased again on May 1. The plan for co-operative savings, in which I have great confidence, is of course only

**Count that day lost—whose low descending sun  
Sees in your hand no Liberty Bond or Gun  
Fight—or BUY BONDS**

just starting, so that at present, under the 2-cent an hour guaranty, we are paying substantially increased amounts.

"The probable cost of coal for the system for the calendar year 1918 will be approximately \$1,000,000 more than for the year before the war, and, in the meantime, the cost of everything else has gone up.

"The result of all these things is that at the present time the Bay State Street Railway is not earning its operating expenses, to say nothing of earning any return on the investment, and our estimate for the year, on the basis of present rates of fare, indicates that we would just break even on the operating costs, even including summer business.

"In order to straighten things out we need something over \$2,000,000 more revenue, and we have to-day (March 28) filed a schedule of fares which, with the other schedules that are now pending before the commission, will, we estimate, result in an increase in income about this amount.

"In nearly every city we are making an inner 'city zone,' which in general is 3 miles across. The fare under this new schedule will be 6 cents, without tickets. Then we are separating the

balance of the city from the country district as accurately as we can, and we are going on a basis of 7½-cent fares within the city for the area outside the so-called 'city zone' or 3-mile area, which I have just mentioned. In order to collect this 7½-cent fare we will sell tickets at the rate of six for 45 cents, and anyone not having a ticket will be charged 8 cents. Outside these two zones in the cities the whole country district is being zoned, under the schedules which were filed some months ago, so that all the system outside of the cities will be on the basis of 2, 2½ or 3 cents a mile, depending on the traffic density of the different lines.

"Workingmen's tickets are continued on the basis of 70 per cent of the regular fare wherever workingmen's tickets or transfers are now in force."

## City Fights Fare Increase

**Mr. Connette Fixes Present Value of Third Avenue System at \$56,000,000 on Five-Year Average Prices**

The Third Avenue Railway fare increase hearing on March 26 before the Public Service Commission for the First District, New York, N. Y., was featured by another move on the part of Assistant Corporation Counsel John P. O'Brien to secure a ruling in regard to the jurisdiction of the commission. Mr. O'Brien made an argument for the dismissal of the application for a 2-cent transfer charge upon the ground that the commission has no power to authorize such an increase in view of 5-cent fare franchises granted by the city. He asked that the commission rule upon this point immediately, in order that in the event of an adverse opinion the city might take the matter to court and have the point finally settled before going to the expense of fighting the rate case further. The commission reserved decision and instructed the company to proceed with its case.

On April 1 the company presented appraisal figures for its entire property actually in public service on July 1, 1917. The appraisal was made by E. G. Connette, president United Gas & Electric Engineering Corporation, New York, N. Y., who was once on the staff of the commission and in 1909 made an appraisal of seven of the fifteen parts of the company's system.

Mr. Connette based his appraisal figures on the average unit prices prevailing in the last five, the last eight and the last ten years as to materials which would be utilized in reproducing the properties of the system. He fixed the net value of the property, after including development charges and current assets, and deducting depreciation, obsolescence and inadequacy as follows: Five years' average, \$56,364,852; eight

years' average, \$53,465,703; ten years' average, \$52,520,885.

Mr. Connette found the total appraisal value on the basis of the five years' average unit prices to be \$66,449,051, from which he subtracted \$10,084,199 estimated for depreciation, obsolescence and inadequacy. On the eight years' average unit prices he found a total value of \$62,920,599, from which he subtracted an estimate for depreciation, obsolescence and inadequacy, amounting to \$9,454,856. On an average of ten years' prices, he found the total value to be \$61,749,715. He made a subtraction of \$9,228,830 from this item for estimated depreciation, obsolescence and inadequacy.

## Six-Cent Fare for Providence

**Committee Now Recommends Relief for Rhode Island Company by Flat Fare Instead of Zone System**

The special legislative committee considering the Rhode Island Company situation voted on April 2 to recommend a 6-cent fare with eighteen tickets for \$1 to be in effect until one year after the signing a treaty of peace in the present war.

By vote of five to one the committee defeated a resolution to report in favor of State ownership and by a vote

**A Good Return on your Money  
A Quick Return for our Men  
BUY LIBERTY BONDS**

of five to two the committee defeated a motion to report in favor of the zone system as recommended by the special commission in its report presented a month ago.

The resolution as provided by the committee by vote of four to three is as follows:

"Resolved, that this committee recommend that temporary relief be granted the Rhode Island Company by increasing the flat 5-cent fare to 6 cents with the issue of tickets at the rate of eighteen for \$1, such relief to be effective May 1, 1918, and to continue in operation during the present war and one year from the date of signing the treaty of peace."

On April 3 the report of the special committee, together with the minority reports, was presented to the Legislature. At the same time an act was introduced in the House authorizing the Public Utilities Commission to carry into effect the recommendations in the majority report. It will be considered April 10.

Some time ago a special commission appointed by the Legislature early in 1917, ordered the adoption of a system of 5-cent central areas, with 2-cent intermediate zones, and recommended taxation and franchise reforms as measures of relief for the company. The Legislature prevented the Public Utilities Commission from putting these changes into effect. It then began the inquiry which has now resulted in the recommendation of the 6-cent fare.

## Fare Dispute in Cleveland

### Much Heralded Low-Fare City a Victim of High-Cost Epidemic —City Replies to Fare Request With an Injunction

Common Pleas Judge Pearson, in a decision rendered on the afternoon of March 30, granted an injunction to the city of Cleveland, Ohio, restraining the Cleveland Railway from raising the fare, as had been planned. The suit was filed in the forenoon of the same day by City Law Director FitzGerald. Notice of appeal was given by the company's attorneys.

On April 2 the Court of Appeals reversed the decision of Common Pleas Judge Pearson and the company put into operation the next higher rate the following day. This is 4 cents cash or seven tickets for a quarter, with a charge of 1 cent for transfers which is rebated. The city gave notice of an appeal to the Supreme Court and attorneys for both sides will appear before that tribunal on April 16.

The Tayler grant, under which the railway operates, provides for an automatic increase in the rate of fare whenever the interest fund falls below \$300,000. This point was passed some time ago and the fare was advanced to three tickets for 10 cents with a charge of 1 cent for transfers with no rebate. The next higher rate provided in the Tayler franchise is 4 cents cash fare and seven tickets for 25 cents.

At the hearing before Judge Pearson City Law Director FitzGerald argued that the present rate of fare in force since Dec. 26, 1917, had not received a trial sufficient to determine whether it will replenish the interest fund. Attorney Harry Crawford, representing the company, said that the condition of the interest fund was now such that the city owed the company \$380,000.

Fielder Sanders, Street Railway Commissioner, said that the failure of the present rate of fare to increase the interest fund was due to the unusual weather conditions in January and to the fact that the number of patrons decreased 1,200,000. He concluded that the \$380,000 could be made up at the present rate of fare under operating conditions such as existed in 1916. It would require five years to accomplish this under present conditions.

In a letter to John J. Stanley, president of the company, on March 28 Mr. Sanders suggested that the question of rate of fare be submitted to arbitration. On the following day Mr. Sanders received a reply in which Mr. Stanley said he could see nothing to arbitrate. Among other things Mr. Stanley said:

#### PAY AS YOU GO

"The rate of fare ought to have been raised to the maximum last year, as you well know. I know the present rate of fare will not bring enough income to restore the interest fund while wages and prices continue as high as they are now and while the city requires of the company the present service. So do you.

"You can reduce the service; we can

put up the fare. One thing or the other must be done and done now. Present cost of operation ought to be paid by present car riders, not by their sons.

"Neither you nor any Councilman should hesitate to assent to the increase in fare. Nor should any attempt be made by Republicans to shift the duty to Democrats or by Democrats to force it upon Republicans.

"You say that on the figures for January and February the city is of the opinion that the present rate of fare has not had a fair trial. What is your own opinion?

"Weather conditions were certainly bad in January. But they were much better in February. Yet the interest fund decreased \$49,413 in that short month. It will continue to decrease so long as the present service is furnished at the present rate of fare.

"If you prefer to reduce the service so that the present fare will give us a surplus every month until the interest fund climbs to \$700,000, send us new schedules and we will put them into effect."

Mr. Sanders claims that the right of arbitration of the necessity of raising the rate of fare is not excluded by the Tayler franchise and that the public must be considered. He did not reply to Mr. Stanley's letter, but instead proceeded with the injunction case.

Platformmen in the employ of the company have decided to demand an increase of 25 cents an hour on May 1. This would make the maximum hourly wage 60 cents. In addition they will ask that 40 per cent of all runs be completed in eleven hours, 40 per cent in twelve hours and 20 per cent in thirteen hours, with a minimum work-day of eight hours. The minimum day for some time past has been five hours.

Officers of the company say that if these demands were granted a straight 7-cent rate of fare would be necessary.

## Public Service Hearings Continued

### Other Witnesses Follow President McCarter in Explaining Need of Higher Fares for New Jersey System

During the past week the Public Service Railway, Newark, N. J., continued to present its case for increased fares before the Board of Public Utility Commissioners of New Jersey. The general statement of the situation made by President T. N. McCarter, as noted in the *ELECTRIC RAILWAY JOURNAL* of March 30, has been supplemented by the testimony of others in regard to various phases of the company's need.

At a hearing on March 27 the chief witnesses were F. H. Sillick, comptroller of the Hudson & Manhattan Railroad, New York, N. Y.; Prof. Albert S. Richey, of the Worcester (Mass.) Polytechnic Institute; and Joseph K. Choate, vice-president of the J. G. White Management Corporation, New York, N. Y. Other witnesses were half a dozen employees from various parts of the State, called to explain the wage situation to-day and the need of an increase in pay.

Mr. Sillick expressed the opinion that the increase to 7 cents desired by the company would result in an increased revenue of about 15 per cent. His opinion was based on the experience of his company following the increase in the tube rate to uptown points in New York City. Professor Richey expressed a similar opinion. In regard to a zone system, the latter witness stated that such a system would require several months of preparation. Theoretically it was worthy of consideration, but the difficulty of fare collection, especially in densely populated territories, was an obstacle to practical application.

Mr. Choate explained to the commission how the electric railways of the whole country have approached the point where a 5-cent fare is insufficient.

As to the desirability of a zone system, Mr. Choate said that in theory the distance tariff or zone system as adopted in Europe is a correct one, but in this country it is almost an impossibility in city service.

On March 28 Prof. Roswell McCrea, Columbia University, New York, N. Y., showed how labor costs have increased in the last few years. In his opinion there will be a further increase, owing to the scarcity of workers, increased living costs and the growing "competitive power" of workers.

R. E. Danforth, vice-president and general manager of the company, gave the detailed figures of increased operating costs in 1917. He said that tales of high wages in other industries were attracting men away from the railway, and other employees are necessary.

At a hearing on April 1 Dr. Thomas Conway, Jr., University of Pennsylvania, Philadelphia, Pa., testified in regard to how electric railways have been carrying passengers for less than the cost of service. In his opinion, these utilities have suffered more than other public service companies from the present increased cost, because their expenses are more largely composed of the cost of labor.

Various associated municipalities of New Jersey, which are opposing the company's application for financial relief, have retained the services of Delos F. Wilcox, New York, and Peter Witt, Cleveland, Ohio. Mr. Wilcox has charge of the preparation of the proof to be submitted on behalf of the municipalities. The municipalities contend that the 5-cent fare has afforded more than a reasonable return upon the actual investment and is still sufficient to afford such a return.

## Portland Appeals Fare Case

The city of Portland, Ore., has filed notice of appeal to the State Supreme Court from the decision of the six circuit judges of Multnomah County, who, after hearing arguments *en banc*, decreed that the Public Service Commission had legal authority to increase fares for the Portland Railway, Light & Power Company from 5 cents to 6 cents. The appeal is directed against both the commission and the company. The city has filed a bond guaranteeing to pay whatever costs may be assessed against it in the higher court. The decision of the court in this case was reviewed in the *ELECTRIC RAILWAY JOURNAL* for March 30, page 617.

## New Transfer System in Trenton

The Trenton & Mercer County Traction Corporation, Trenton, N. J., has put into effect a new transfer system designed to prevent the abuses of the transfer privilege which grew up under the system previously in force. This change is in line with the suggestion made by Peter Witt, Cleveland, in his study of traffic conditions in Trenton. Mr. Witt's recommendations were reviewed in the *ELECTRIC RAILWAY JOURNAL* of Jan. 19, page 138.

## Transportation News Notes

**Fare Complaint Withdrawn.**—The complaint filed last July by the Commuters' Association against the Philadelphia & Western Railway, upper Darby, Pa., operating between Sixty-ninth Street, Philadelphia, and Norris-town, has been withdrawn.

**Suggest Higher Fares in Newport.**—V. W. Freeman, president, and Polk Caffoon, secretary of the South Covington & Cincinnati Street Railway, on March 25 suggested to the city officials of Newport, Ky., an increase in the rate of fare from 5 cents to 6 cents.

**Railway Will Run Three Buses.**—The Winnipeg (Man.) Electric Railway proposes to install a service of three buses in connection with a section of the city not now served by its electric railway lines. There will be an exchange of transfer privileges between the railway and the buses.

**Trans-Bay Fare Cases Put Over.**—The hearing of the Southern Pacific Company and Key Route trans-bay fare cases, which was set for April 1, has been changed to April 17. The postponement was made necessary owing to the inability of the Railroad Commission to finish by April 1 the hearing on the Spring Valley Water case.

**Automobiles Cause Half the Injuries.**—The Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.,

## Don't put off till to-morrow the Bond you can buy to-day

reports that in 1917 automobile accidents were responsible for more than one-half of all injuries. In 1917 there were 1088 injuries as compared to 1063 in 1916. A total of 121 persons were injured while getting on and off cars.

**One-Man Cars and Fare Boxes for Houston.**—The Houston (Tex.) Electric Company has received ten new one-man cars which have been put into service as an experiment on some of the most congested lines of the city. The company has also received a shipment of fare boxes. All cars will be equipped with the boxes as soon as they are received.

**Seven-Cent Fare in Keene.**—The Keene (N. H.) Electric Railway has increased its fares under authority of the Public Service Commission of New Hampshire from 6 cents to 7 cents. The appeal of the company to the commission was noted in the *ELECTRIC RAILWAY JOURNAL* of March 23, page 591. The commission held no hearing as no objection was made to the new rate.

**Six-Cent Fare for Oklahoma Road.**—The Corporation Commission of Oklahoma has issued an order authorizing the Chickasha (Okla.) Street Railway to charge a regular passenger fare of 6 cents in that city. Campbell Russell, a member of the commission, said that electric railways in cities and towns of 10,000 to 15,000 population will continue to experience great difficulty in meeting expenses.

**Skip Stops for New Jersey.**—The Public Service Railway, Newark, N. J., will adopt the skip-stop on its Essex division on April 8. The territory affected comprises Essex County and the West Hudson towns. Stops will average about eight to the mile, except in the business section, where they will be more frequent. Stopping places will be designated by white bands on the trolley poles.

**Cleveland & Eastern Wins Fare Case.**—On March 19 the Supreme Court of Ohio dismissed an appeal from a decision of the Public Utilities Commission made by the Commissioners of Cuyahoga County in the case of the Cleveland & Eastern Traction Company. The commission had granted the company authority to increase its rate of fare between Cleveland and South Euclid from 5 to 10 cents.

**New Jitney Measure Proposed.**—The proposed jitney ordinance filed recently with the City Council of Portland, Ore., has been approved by a committee of jitney men. The ordinance provides that drivers of jitneys shall furnish a bond of \$1,000 instead of \$2,500 as now required. The Council has been requested to pass the measure, and then refer it to the voters for consideration at the special city election to be held May 17.

**Hoboken Wants Action.**—The Board of Public Utility Commissioners of

New Jersey has been requested by Corporation Counsel John J. Fallon of Hoboken, to hand down a decision on Hoboken's application for a 3-cent fare over the lines of the Public Service Railway in that city prior to the decision of the board on the 7-cent fare asked by the company. Three years ago the city of Hoboken applied for a 3-cent fare. The claim was made that Hoboken was only a mile square in size and that the company should charge only 3 cents in that city.

**"For Humanity's Sake."**—An appeal to automobilists for safety, with this title, has been published by J. H. Handlon, claims agent United Railroads of San Francisco. It is a pamphlet of forty-eight pages, showing on each right-hand page a different kind of automobile accident. The accident is illustrated by a picture diagram, and a brief description is given to explain how the accident might have been avoided. The general principle or moral is then stated in epigrammatic form. On each left-hand page is a quotation or maxim on the necessity for care.

**Walla Walla Feels the War Pinch.**—According to E. G. Miller, traffic manager of the Walla Walla (Wash.) Valley Railway, the deficit of the company is about \$40,000. The company has announced in a bulletin to the public that it will abandon the East Walla Walla line, 1½ line long; that city fares must be raised to 7 cents; and, interurban fares must be advanced to a basis of 2½ cents a mile. The company also asks the elimination of the franchise tax, protection from jitney competition and relief from paving assessments.

**Winnipeg to Issue Paper.**—The Winnipeg (Man.) Electric Railway has established a publicity department which will be under the direction of H. C. Howard, formerly on the staff of the *Winnipeg Free Press*. In connection with the publicity department it is the intention of the company to issue a publication which will take the form of a pamphlet to be distributed regularly on the cars. In it matters of public interest will be discussed in frank talks from time to time, with the hope that a greater degree of confidence and goodwill may be attained between the company, its employees, and the public.

**Indiana Interurban Seeks Increase.**—A petition for an increase in passenger rates has been filed by the Winona Interurban Railway, Warsaw, Ind., through its receiver, with the Public Service Commission of Indiana. The petition asks that the company be allowed to change its rates from 2 cents per mile to a rate basis of 2½ cents per mile, with a minimum charge of 10 cents. The petition states that operating expenses have increased so abnormally during the past few years that in order to continue operations relief is necessary. The date for the hearing has not yet been set by the commission.

## Personal Mention

W. C. Twomey, formerly auditor of the Chicago & West Towns Railway, Oak Park, Ill., has joined the army.

J. E. Lawless, former master mechanic of the Paducah (Ky.) Traction Company, has been transferred to Fort Worth, Tex.

W. H. Bennett, formerly master mechanic of the Sterling, Dixon & Eastern Electric Railway, Dixon, Ill., is now connected with the Brown Show Company, Dixon.

H. C. Howard, formerly of the staff of the Winnipeg *Free Press* has been placed in charge of the publicity department of the Winnipeg (Man.) Electric Railway, which has been established by the company in its desire to promote better relations with the public.

Neal Funk has been appointed to succeed his father, the late J. T. Funk, as head of the claim department of the Louisville (Ky.) Railway. Neal Funk has been with the company for a number of years and for some time past had been assistant to his father.

M. Skouden, who has been connected with the Union Traction Company, Anderson, Ind., for seventeen years in various capacities, has been appointed superintendent of motive power to succeed R. N. Hemming, whose appointment to the Fort Wayne & Northern Indiana Traction Company is noted elsewhere in this department.

Lee J. Wells has been appointed acting superintendent of the St. Petersburg & Gulf Railway, St. Petersburg, Fla., to succeed Edward Morton, Jr., who has become connected with the Philadelphia Iron & Steel Company. Mr. Wells worked as a conductor for many years for the company and in 1915 was promoted to dispatcher.

Joseph H. Alexander, formerly assistant to the president of the Cleveland (Ohio) Railway, has been promoted to the rank of colonel in the quartermaster's department. He was called to Washington last fall and given the rank of major. Colonel Alexander is engaged in the cantonment and construction division.

P. W. Gerhardt has been appointed railway superintendent of the Savannah (Ga.) Electric Company. Mr. Gerhardt was for many years superintendent of transportation of the Dallas Consolidated Electric Street Railway, the Metropolitan Electric Street Railway and the Rapid Transit Railway, Dallas, all included now in the Dallas Railway, under the service-at-cost franchise. Before going to Dallas Mr. Gerhardt was connected with the Twin City Rapid Transit Company, Minneapolis, Minn.

J. Frank Johnson, railway engineer, who was in charge of the publicity campaign of the Dunham (N. C.) Traction Company in connection with its request to the city for a 6-cent fare, has

been transferred to the Bartlesville (Okla.) Interurban Railway in a similar capacity. The conduct of the campaign at Durham was referred to in the *ELECTRIC RAILWAY JOURNAL* for March 30, page 635.

R. N. Hemming has resigned as superintendent of motive power of the Union Traction Company of Indiana, Anderson, Ind., to become connected with the Fort Wayne & Northern Indiana Traction Company as superintendent of transportation, with headquarters at Fort Wayne. Mr. Hemming has been connected with the Union Traction Company of Indiana as superintendent of motive power since Oct. 1, 1911. Prior to his employment with that company he was with the diversi-



R. N. HEMMING

fied holdings of the Dr. S. B. Hartman interests for seven years as chief engineer. In 1907 Mr. Hemming built and managed the Ohio & Southern Traction Company. Three years prior to that he was electrical engineer for the Buckeye Steel Castings Company, Columbus, Ohio. He was also chief electrician for the municipal light plant at Columbus, Ohio. Mr. Hemming has served on the standardization committee of the Central Electric Railway Association for seven years and for three years was chairman of that committee. He also served on the equipment committee and other joint and sub-committees of the American Electric Railway Association for three years and was co-chairman of the committee on transportation appointed by that association.

M. E. Foley, attorney for the Indianapolis Traction & Terminal Company, Indianapolis, Ind., has been appointed by Governor Goodrich as chairman of the State Council of Defense of Indiana.

Arthur Preger, assistant treasurer of the Springfield Railway & Light Com-

pany and the Springfield (Mo.) Traction Company, has been appointed manager of the Albuquerque Electric Light & Power Company, Albuquerque, N. M., to succeed W. P. Southard, made general manager of the Trinidad Electric Transmission, Railway & Gas Company. Both properties are controlled by the Federal Light & Traction Company.

Winthrop M. Daniels has been elected chairman of the Interstate Commerce Commission for one year dating from March 17, to succeed Henry C. Hall. The election of Mr. Daniels as chairman is in pursuance of the policy adopted in 1911, that the term of office of the chairman of the commission shall be for one year, and that the office shall be filled from year to year in the order of seniority of service.

E. H. Thomas, a former newspaper man of Seattle and Bellingham, Wash., has been appointed to the position of publicity agent of the Puget Sound Traction, Light & Power Company, Seattle, Wash., created in the executive offices. He will co-operate with the publicity agents of the local companies of Seattle, Tacoma, Everett and Bellingham in standardizing advertising and publicity in which the several companies are interested.

Harry H. Reigel has resigned as purchasing agent of the Reading Transit & Light Company and Metropolitan Edison Company, Reading, Pa., after seventeen years of continuous service. He has held positions of authority and trust during almost the entire period of his service with the company, having been transitman, timekeeper, paymaster, cashier, chief clerk and treasurer until the retirement some time ago of John A. Rigg, former president of the company.

Joseph F. Elward has been appointed assistant master mechanic of the Indianapolis Traction & Terminal and Terre Haute, Indianapolis & Eastern Traction Companies, in charge of the West Washington Street Shops, Indianapolis, Ind., during the absence of L. M. Clark, who is serving with the colors as major in the ordnance department. Mr. Elward entered the service of the Indianapolis Traction & Terminal Company as car inspector in 1902, and was promoted to carhouse foreman in 1905. On May 1, 1910, he was appointed to the position of chief car inspector.

W. L. Davis, until recently a traveling auditor on the staff of the American Power & Light Company, New York, N. Y., has been appointed auditor of the Lehigh Valley Transit Company, Lehigh Valley Light & Power Company and affiliated companies, at Allentown, Pa. Mr. Davis was formerly connected with the firm of Ernst & Ernst, certified public accountants, Cincinnati, Ohio. Mr. Davis began his work in the railway field in 1906 with the Ohio Electric Railway and was appointed statistician of the company in 1909, serving in this work until 1912,



when he joined the organization of the Texas Power & Light Company, Dallas, Tex., first as traveling auditor and later as assistant secretary-treasurer. From 1914 to 1915 Mr. Davis was auditor for the Southern Traction Company and the Texas Traction Company, both of Dallas.

W. P. Southard, manager of the Albuquerque Electric Light & Power Company, Albuquerque, N. M., and the City Electric Company for three years, will be transferred to Trinidad, Col., to become general manager of the Trinidad Electric Transmission, Railway & Gas Company. Previously Mr. Southard was manager of the Las Vegas Light & Power Company, Las Vegas, N. M., and the Las Vegas Transit Company. Mr. Southard succeeds at Trinidad E. C. Deal, who, as noted in the *ELECTRIC RAILWAY JOURNAL* for March 30, has been transferred to Springfield, Mo., as manager of the Springfield Railway & Light Company and the Springfield Traction Company. All of the properties are controlled by the Federal Light & Traction Company.

Sam W. Greenland, general manager of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., has been selected to supervise the construction of a government power plant at Baltimore, Md., to be used in connection with a munition factory. This task will require at least six months before it is completed, and Mr. Greenland will remove with his family to Baltimore, remaining there until the job is finished when he will return to Fort Wayne. Since the beginning of the war Mr. Greenland has taken an active part in patriotic work. In the Liberty Loan drives, Red Cross campaigns, Y. M. C. A., and boys working reserve activities, he has been very prominent. During his absence in Baltimore, Mr. Greenland's duties as general manager will be carried on by other department heads.

D. P. Falconer has resigned as engineer of maintenance of way of the New York State Railways, Rochester lines, to manage the sales and develop a market for magnesium, a new metal, for the Shawinigan Electro-Metals Company, and has opened an office for the company at Cleveland, Ohio. Mr. Falconer's first railroad work was done for the Pennsylvania Railroad, by which he was employed in various capacities in the maintenance of way department of the lines west of Pittsburgh. He entered electric railway work with the New York State Railways in April, 1919, as assistant engineer of maintenance of way, and in 1912 was promoted to engineer of maintenance of way of the company. Since that time Mr. Falconer has had charge of track, pavement, bridge and similar work for the lines in Rochester and the Rochester & Eastern Railway. His activities have covered the construction, maintenance and design of work done by the maintenance of way department.

## A. Merritt Taylor to Go to Washington

**Will Be Manager of Passenger Transportation for Emergency Fleet Corporation and Shipping Board—Was Transit Commissioner of Philadelphia**

Charles Piez, vice-president and general manager of the Emergency Fleet Corporation, announced in Washington on April 2 the appointment and acceptance of A. Merritt Taylor as manager of passenger transportation for the corporation and the Shipping Board, with offices at Washington. The creation of this position means a new division of work in the shipbuilding scheme of the government, as the new branch will not be a part of the housing division, which has heretofore had charge of transportation problems. The work of passenger transportation is one of the most important of the government, when it is considered that the building of ships is dependent upon the arrangements made to transport shipyard workers to and from the yards.

Mr. Taylor has arrived in Washington and has entered upon his work. In

Born in 1874 near Burlington, N. J., Mr. Taylor, at the age of fifteen, became an indentured apprentice in the machine shops of William Sellers & Company, of Philadelphia. After reaching his twenty-first year he engaged in the handling of investment securities, largely real estate mortgages, railway stocks and bonds, and during this time he became interested in the Philadelphia & West Chester Traction Company. He was elected president of this company in January 1899 at the age of twenty-four years, in which office he has since continuously served. Under his administration the company has been developed from a struggling organization, operating only about 8 miles of track, to its present prosperous condition with about 50 miles of track, most up-to-date equipment and method of operation. In 1902 he became interested in the company operating the old Fort Lee Ferry from 130th Street, New York, to Edgewater, N. J., and the electric railway from Edgewater to Englewood. In that year he and his associates incorporated the New Jersey & Hudson River Railway & Ferry Company, which acquired these properties, and Mr. Taylor was elected president. Under the new management modern double-deck ferryboats were put into service, a new commodious ferry-house was constructed on the New York City side, and the railway was extended through Hackensack and on to Paterson, N. J. An additional line was also acquired, extending from Hackensack to Newark. The company prospered from the outset. After the sale of this property to the Public Service Corporation Mr. Taylor resigned as president.



A. M. TAYLOR

discussing his plans with the Washington representative of the *ELECTRIC RAILWAY JOURNAL*, he said he hoped to bring to Washington a number of engineers to assist in the work, as there are 145 shipyards on the Atlantic, Pacific and Gulf coasts, and in many of them transportation questions will have to be solved.

### APPOINTS A STAFF

Mr. Piez said he welcomed the opportunity to work in conjunction with Mr. Taylor, and that the latter is now selecting his own staff of engineers. Among the appointments so far made of assistants by Mr. Taylor are the following: A. B. Maine, formerly chief clerk in the Department of City Transit, Philadelphia; Charles C. Cooke, Jr., member of the firm of Kelly, Cooke & Company, engineers, Philadelphia; Howard S. Hipwell, John A. Renshaw and Walter C. Solly, who were formerly assistant engineers in the Department of City Transit, Philadelphia. Mr. Solly was recently with the New Chester Water Company, Chester, Pa.

### BECOMES TRANSIT COMMISSIONER

In May, 1912, Mr. Taylor was appointed by the Mayor of Philadelphia transit commissioner to investigate the problems of improved transit facilities in Philadelphia. Within thirteen months Mr. Taylor completed his report, which was a most exhaustive analysis of the problems involved. He then advised with eminent counsel as to what legislation was needed to establish and finance this system and appeared before the Legislature at Harrisburg urging the passage of the necessary bills, all of which passed, and later accepted by the people of Philadelphia by an overwhelming vote. In performing this important work Mr. Taylor declined to accept pecuniary compensation for his services. Mr. Taylor was then appointed by the Mayor director of the newly created Department of City Transit. He held office until January, 1916, and during this time had the satisfaction of seeing actual construction begun on the city's new subway and elevated lines according to the "Taylor Plan."



# Construction News

Construction News Notes are classified under each heading alphabetically by States. An asterisk (\*) indicates a project not previously reported.

## Recent Incorporations

**\*Cumberland Power Company, Wilmington, Del.**—The Cumberland Power Company has filed its certificate of incorporation with the Secretary of State of Tennessee. This concern is incorporated under the laws of Delaware, with its principal office at Wilmington. The purposes of the company are to purchase or otherwise acquire, construct, and operate electric railways and power plants. Capital stock, \$100,000. Incorporators: F. D. Buck, M. L. Horty, and K. E. Longfield.

**Chatham County Traction Company, Savannah, Ga.**—Application for a charter will be made by the Chatham County Traction Company for the construction of an electric line from the intersection of Augusta Avenue with Lathrop Avenue, Savannah, to Port Wentworth, about 6 miles. The company also desires to own and operate electric plants and furnish electric light and power. Capital stock, \$150,000. Among the incorporators are H. C. Foss, secretary of the Savannah Electric Company; W. W. Osborne, A. A. Lawrence, David S. Atkinson and Edmund H. Abrahams, all of Savannah. [March 9, '18.]

**\*St. Clair Central Railway, Belleville, Ill.**—Incorporated to construct a line from East St. Louis to Benton. Capital stock, \$5,000. Incorporators: John T. Taylor, Belleville, Ill.; John Henderson, St. Louis, Mo.; L. E. Fischer, St. Louis, Mo., and W. C. Wolf and P. K. Johnson, Belleville, Ill.

## Franchises

**Coronado, Cal.**—The San Diego, South Eastern Railway has received a franchise from the City Council for an extension on First Street to K Avenue, thence over private property to Fourth Street and the shore of Spanish Bight, where a bridge is being erected by the government.

**Los Angeles, Cal.**—The Pacific Electric Railway has been denied authority by the California Railroad Commission to build a line from Anaheim through Tustin to the town of Irvine, a distance of about 11 miles, and also a line from Glendora to Lone Hill, about 4 miles.

**New York, N. Y.**—The Public Service Commission for the First District of New York has granted the application

of the Union Railway for permission to construct an extension of its Fordham Road-207th Street Crosstown Line, so as to provide street car access to and from the Dyckman Street Ferry. The Board of Estimate & Apportionment has already granted a franchise for this extension.

**Marietta, Ohio**—The Kanawha Traction & Electric Company will ask the City Council of Marietta for a new franchise. As a number of improvements in their lines and service are being planned by the company, the new franchise is sought to secure them against loss. The franchise under which they are now operating, expires within about three years.

## Track and Roadway

**Alabama Interurban Railway, Birmingham, Ala.**—The proposed line of the Alabama Interurban Railway will extend from Birmingham to Lock No. 17 on the Warrior River, about 20 miles, with branches to Patton Ferry, 5 miles, and to Shoal Creek, 15 miles. Another branch to Taylor's Ferry and an extension to Lock No. 16 and Davis Creek are contemplated. Thomas L. Cannon, Birmingham, president. [March 16, '18.]

**Pacific Electric Railway, Los Angeles, Cal.**—Los Angeles County and the Pacific Electric Railway plan to erect a steel and concrete bridge over Vergugo Wash on Brand Boulevard, North Glendale. The cost is estimated at \$50,000.

**Municipal Railway, San Francisco, Cal.**—Plans are being made to extend the Municipal Railway beyond the Twin Peaks tunnel. At a recent conference in the Mayor's office a resolution was adopted by the Public Utilities Committee directing the Board of Works to prepare plans and specifications for the construction of two extensions and appropriating \$10,000 for this work.

**Tampa (Fla.) Electric Company.**—This company will construct an extension on Twenty-second Street and also on Chapin Street.

**Orleans-Kenner Traction Company, New Orleans, La.**—The Orleans-Kenner Electric Railway has been reorganized under the name of the Orleans-Kenner Traction Company. The property of the company was recently sold under foreclosure to J. Blanc Moore for \$225,000.

**\*Eastern Maine Railroad, Bangor, Me.**—A report from George W. Maxfield, president of the Eastern Maine Railroad, states that the company proposes to construct either a steam or electric railway from Bangor, crossing

the Penobscot River to Brewer, thence in an easterly direction through the vast timber-lands of eastern Maine through to Holton, a distance of 112 miles. Right-of-way has been purchased for about 32 miles. The company will reach amusement parks and will be able to furnish power for lighting. No contracts have as yet been awarded for the construction of the line. The officers of the company are: George W. Maxfield, Bangor, president and general manager, and Charles L. Andrews, Augusta, secretary and treasurer.

**Minneapolis (Minn.) Street Railway.**—Mayor Thomas Van Lear of Minneapolis has asked the City Council to compel the Minneapolis Street Railway to construct seven extensions in outlying districts as ordered eleven months ago.

**Hudson & Manhattan Railroad, New York, N. Y.**—The Hudson & Manhattan Railroad will extend its rapid transit system from its terminal in Newark to the Newark Bay section to provide better transportation facilities for the 250,000 workers to be employed in the shipyards filling the contracts of the United States Emergency Fleet Corporation. The plans have been approved by the shipping board.

**Interborough Rapid Transit Company, New York, N. Y.**—Bids will be received by the Public Service Commission for the First District of New York on April 17, for laying tracks and for materials for finishing the Eastern Parkway and Nostrand Avenue subway extensions of the Interborough Rapid Transit Company in Brooklyn. At the same time bids will be opened for completing the Brighton Beach connection between the Brighton Beach line and the Fourth Avenue subway.

**Long Island Electric Railway, New York, N. Y.**—After an inquiry lasting several years, the Public Service Commission for the First District of New York has ordered the Long Island Electric Railway to abandon a part of its present route between Rockaway Road and Grant Avenue, Queens, and to build a double-track line in Liberty Avenue.

**Cincinnati (Ohio) Traction Company.**—C. W. Culkins, director of street railroads, will ask the City Planning Commission to approve the construction of a loop on Warner Street to provide a turning point for cars operating on a new line to be known as the Fairview line, running between Fairview Heights and Fountain Square. Mr. Culkins is also considering the extension of one of the city lines to the village of California and the extension of the Madison Road line to Delta Avenue.

**Mansfield Railway, Light & Power Company, Mansfield, Ohio.**—It is reported that Henry L. Doherty & Company, who operate the Mansfield Railway, Light & Power Company, plan extensive improvements and changes in Casino Park.

**\*Miami, Okla.**—It is reported that business interests have subscribed \$200,000 toward the construction of the proposed electric railway from Miami to Picher and other towns in the mineral district. H. B. Cobban, president Miami Business Men's League, may be able to give information.

**Portland, Ore.**—A survey of all streets in the city of Portland has been ordered by Commissioner Barbur of the Department of Public Works, to determine the extent of the maintenance and repair work necessary, with particular attention to the condition of the tracks of the Portland Railway, Light & Power Company, which are in bad condition on many lines. It is expected an expenditure of \$500,000 will be required.

**Valley Railways, Lemoyne, Pa.**—It is reported that if the government quartermaster depot is placed at Marsh Run the Valley Railways will construct an extension from New Cumberland to New Market.

**Carbon Transit Company, Mauch Chunk, Pa.**—Plans are being considered by the Carbon Transit Company for the construction of an extension from Packertown to Jamestown, about 1 mile.

**Philadelphia (Pa.) Railways.**—Negotiations are under way between the Emergency Fleet Corporation and the Philadelphia Railways for the rehabilitation of its line and an extension of double-track service over the Penrose Ferry Road to the shipyard at Hog Island.

**Philadelphia (Pa.) Rapid Transit Company.**—Negotiations have been completed by the Philadelphia Rapid Transit Company with the Emergency Fleet Corporation, and the railway will soon begin the extension of its line on Island Avenue at Eastwick to the shipbuilding works of the American International Company at Hog Island.

**Pittsburgh (Pa.) Railways.**—The Public Service Commission of Pennsylvania has issued an order to the Pittsburgh Railways to construct a new line on Wheatland Street.

**\*Grand'Mere, Que.**—Plans are being considered by business men of Grand'Mere and Shawinigan Falls for the construction of an electric railway, costing approximately \$100,000, from Grand'Mere to Shawinigan Falls.

**Charleston Consolidated Railway & Lighting Company, Charleston, S. C.**—It is reported that the Charleston Consolidated Railway & Lighting Company is considering the construction of some track extensions.

**Virginia Railway & Power Company, Richmond, Va.**—A new roller coaster will be erected by the Virginia Railway & Power Company at Forest Hill Park at a cost of \$6,000.

**Seattle (Wash.) Municipal Railway.**—City Engineer A. H. Dimock, Seattle, has submitted to Councilman Oliver T. Erickson, chairman of the city utilities committee, tentative plans for an ele-

vated railway on Washington Street, extending from the Seattle & Rainier Valley Railway's line at Fourth Avenue South to the city's proposed elevated line at First Avenue South, with a terminal station on Third Avenue South, between Washington Street and Yesler Way. The cost is estimated at \$85,770, exclusive of any condemnation judgments that may be awarded as damage to property along Washington Street and Third Avenue South. By extending the elevated line in Third Avenue South from Washington Street to Yesler Way, it is stated a terminal can be made from which twenty street car lines can be reached within half a dozen blocks.

**Puget Sound Electric Railway, Tacoma, Wash.**—Louis H. Bean, president of the Puget Sound Electric Railway, recently conferred with the Pierce County Commissioners in an effort to reach an understanding as to improvements for the company's short line bridge over the Puyallup River, which was wrecked in December by floods. W. J. Roberts, engineer of the Inter-County River Commission, which is in charge of river improvements, will go over the proposed plans with one of the company's engineers and report to the commission. Mr. Bean agrees that the bridge should have two spans, one 200 ft. in length and the other 100 ft. over the river, but wants to pay only one-fourth of the cost of a 600-ft. jetty that must be built to protect the pier-heads.

**Morgantown & Wheeling Railway, Morgantown, W. Va.**—This company has been authorized by the court to issue \$60,000 of receiver's certificates for repairs and betterments on its line.

**Wheeling (W. Va.) Traction Company.**—Negotiations are being carried on between the Wheeling Traction Company and the County Court of Marshall County for improving the "Narrows" road south of McMechen, between the McMechen carhouse and Glendale. At a recent meeting of Marshall County Court, officials of the company fully discussed the situation and submitted plans whereby the highway can be made much safer with the erection of guard rails.

### Shops and Buildings

**Peoples Traction Company, Galesburg, Ill.**—The old carhouse of the Peoples Traction Company located in the southwest outskirts of the city was recently totally destroyed by fire. The loss is estimated at about \$10,000.

**New York Municipal Railway, Brooklyn, N. Y.**—The Public Service Commission for the First District of New York recently received bids for the construction of station finish on seven stations of the Nostrand Avenue branch of the Eastern Parkway subway in Brooklyn. The lowest bidder was A. W. King, New York, at \$249,639.

**Lehigh Traction Company, Hazleton, Pa.**—Plans are being made by the Lehigh Traction Company for the remodeling of its old carhouse and sheds back of its terminal at Wyoming and Spruce Streets into a big amusement hall for dances, basket ball, roller skating and public meetings. The cost is estimated at about \$7,000.

### Power Houses and Substations

**Fort Smith Light & Traction Company, Fort Smith, Ark.**—A 33,000-volt transmission line from Fort Smith to serve Alma and a number of other communities, has been completed and the Citizens' Service Company, which distributes electricity in Alma and other communities, is now receiving its electrical energy supply from the Fort Smith Light & Traction Company. The Citizen's Service Company is completing a line from Alma to Ozark, the electrical requirements of which will also be served by the Fort Smith Company. With the completion of these transmission lines the Fort Smith Company will serve all the electrical requirements for a distance of 45 miles west and south of the city.

**Pacific Electric Railway, Los Angeles, Cal.**—For the purpose of increasing its supply of power for the traffic on the Long Beach—San Pedro and San Pedro—Los Angeles lines, the Pacific Electric Railway has begun the construction of a concrete and brick substation at East Wilmington.

**Decatur Railway & Light Company, Decatur, Ill.**—The Illinois Public Utilities Commission has granted permission to the Decatur Railway & Light Company to operate an electric lighting plant at Dawson and to take over the plant of the Consolidated Light Company of that town.

**Interborough Rapid Transit Company, New York, N. Y.**—Plans are being made by the Interborough Rapid Transit Company for the construction of a new one and three-story transformer station on Seventy-fourth Street near Avenue A, to cost about \$12,000.

**Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.**—Work will be begun at once by the Mahoning & Shenango Railway & Light Company on the erection of a transmission line from Lowellville to McDonald. The line will furnish power to the Youngstown & Niles Railway, a subsidiary company now under construction.

**Reading Transit & Light Company, Reading, Pa.**—The power station of the Reading Transit & Light Company at Collegeville has been dismantled, and the property will be converted into a substation. The best of the machinery and equipment is being utilized elsewhere and the remainder has been sold.

# Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

## Differential Basis on Copper Wire Products

Reason Why Manufacturers with Accumulated Copper Stock Are Quoting Lower Prices

Lower prices have been looked for by the trade on all copper-wire products for some time. This belief was founded on the quotations for base, which have been gradually receding, to present quotations of 27 to 30 cents. When a large wire manufacturer was asked why the price was growing lower in the face of the government or officially established selling figures of 23.50 cents for car lots and 27.67½ cents for less than car load—prices which still prevail and have been extended by the War Industries Board to June 1—he said that the causes were various.

First, quite a stock of copper had been accumulating in the hands of primary buyers, and the market was therefore softening. Then commercial manufacturers who had a stock of high-price copper on hand had gradually worked it off. Conditions had been about equalized. Therefore it was possible on special business to sell wire on a 27-cent base.

Small sizes of wire and cable were still figured and sold on a 30-cent base. Where 27 cents was quoted it was either to meet competition or because of a desire to secure business. In transactions of this kind the credit standing of the customer is the principal factor. On some contracts taken at 27 cents base it is a matter of discounts. Orders at this figure have been accepted at 60 per cent; others at 60 and 5, and again still others at 60 and 10 to large buyers. Orders for more than \$10,000 are figured from cost and a margin of profit ranging from 10 to 25 per cent. Purchasers of large quantities of signal wire, like the prominent railroads, buy on a 23-cent base.

The general average, however, to quote this and other authorities, is a 30-cent base. This figure is quoted to jobbers buying from manufacturers, with a discount of 60 per cent. On orders under \$2,500 the usual discount is 50 per cent. It depends very much upon the commercial rating of the buyer. Sometimes an additional profit may be added for carrying the customer. Rubber-covered, lead, varnish, cambric and paper-insulated materials are sold on a cost basis plus a profit, which, of course, varies with the customer. There is no regular or hard and fast rule. Weatherproof is selling on an established pound basis, which is

now 27 cents. One manufacturer states that all list prices are based on lengths of 250 ft. of one size and kind. For shorter lengths add to list price 20 per cent on lengths up to 100 ft., 10 per cent on 100 ft. to 250 ft.

Large sizes of wire are now selling almost to the exclusion of the small sizes. The sale of the latter has fallen off on account of the almost total suspension of building operations. The government is taking the greater portion of every manufacturer's output. Originally these purchases were made by the wire cable committee of the Committee of National Defense. Within the last five months the shipyards have been buying direct on a competitive basis. They are now the most important outlet for wire products.

## Changes in Carnegie Sales Organization

Colonel Bope Resigns—He Is Succeeded by William Clyde—Other Changes

Effective as of April 1, 1918, Col. Henry P. Bope has resigned his position as vice-president and general manager of sales with Carnegie Steel Company to devote his time to private interests. Colonel Bope became connected with Carnegie Brothers & Company in November, 1879, and has remained continuously in the sales work of that company and its successors up to the present time.

He has been succeeded in his office with Carnegie Steel Company by William G. Clyde, whose connection with the United States Steel Corporation and its subsidiaries dates from 1894, when he became superintendent of the plate mills of the Illinois Steel Company at South Chicago. Later Mr. Clyde became connected with the sales organization of the American Steel Hoop Company as salesman for that company in Chicago, and after the merger of that company with Carnegie Steel Company was traveling salesman for the latter company at Cleveland for three years. In September, 1905, he was made assistant general manager of sales at Pittsburgh in charge of the Bureau of Bars and Hoops, which office he retained until his present promotion. Charles L. Wood, long assistant to Mr. Clyde, has been promoted to be assistant general manager of sales in charge of the Bureau of Bars and Hoops.

H. W. Johns-Manville Company announces that its Memphis, Tenn., office has been moved to new quarters at 804-805 Exchange Building.

## Track Materials Prices

Why Tie Plates and Other Specialties Are Quoted on Another Scale Than Government List

When the table in this department of the *ELECTRIC RAILWAY JOURNAL* is consulted for prices on "Railway Materials," it will be noted that on tie plates, (flat type) and tie plates (brace type) the quotation given is 3¼ cents a pound which is the official or government fixed scale. The same quotations apply to fish plates, angle plates and angle bars. The purchasing agent, however, when coming into the market for tie plates will find a difference in price. According to one of the principal manufacturers these goods are nearly if not quite all special, and instead of being quoted a flat 3¼ cents a pound the figures will be higher for this grade and finish of steel (carbon and hot pressed), being around 3.40 cents a pound in lots of 25 gross tons or more; 4.40 cents a pound for less than 25 gross tons. Higher prices also apply to specifications covering different sizes and lengths as well as the finish. These quotations are f.o.b. mill.

On tie rods and screw spikes, with 8 cents a pound Pittsburgh base, the average price quotations ranging from 6 to 10 cents a pound will be made, according to size and weight. One large mill states it has a heavy stock of rail spikes, on which it is quoting 6 cents a pound. Rail bolts and nuts while on a 4.90 cents per pound, Pittsburgh base, vary in price also as to size, weight and special purpose. Miscellaneous sizes, 5 to 6 cents a pound is named; 7 to 8 cents a pound for short and 8 and 9 cents a pound for special size. High T-rails (Shanghai) and girder rail (grooved) are manufactured by only two steel companies, and while quoted at 4¼ cents a pound are reported as being out of the market.

So far there is less call for rails this year than in 1917. In other words the requirements for 1918 are already provided for and traction companies are asking quotations and making reservations, when possible, for the first and second quarters of 1919. On stock shipments \$70 to \$80 a ton is being quoted, the average being \$75 for T-rails (A. S. C. E. standard). For what is known as Russian rails, made up by the Bethlehem Steel Products Company, Carnegie Steel Company, Lackawanna Steel Company and the United States Steel Corporation, and not deliverable, \$60 a ton is figured. Present deliveries are fifteen months, and the consignee is obliged to obtain a priority order for transportation facilities.

## Acute Tin Shortage May Cause Higher Prices

**Manufacturers of Apparatus, Wire and Cable Express Uneasiness—  
Cost of the Metal Advancing**

A sharp shortage of tin is not only freely acknowledged now but it has been in evidence for several months. The supply at the present time is less than ever. Prices have been climbing in harmony with the depleted stocks of the metal in this market. A number of manufacturers were waited upon by the *ELECTRIC RAILWAY JOURNAL* to ascertain the true state of affairs in so far as tin and its various alloys and amalgams affected the output and prices on electric railway products. At the office of one prominent concern the acute curtailment in tin stocks was frankly admitted and it was stated that the condition of the market is giving rise to a feeling of uneasiness.

Reserve supplies of tin in the hands of manufacturers of electrical apparatus, wire, cable, dry batteries and other lines are not large. One wire and cable producer said his company had recently bought 5000 lb. of Straits tin at 84 cents, or approximately four times the pre-war normal price.

Tin plays a very important part in the electrical and allied supplies market. Condensers are either coated with tin or they are made of an amalgam of tin and copper. Boiler tubes are also tin-lined, and if a substitute equally good were not made this would cause a serious predicament for central stations. All copper wire to be rubber-covered is first coated with pure tin. If this metal continues to be scarce and high, an early advance in the price of rubber-covered wire must naturally follow, in the opinion of a prominent manufacturer. At present, to use the statement of the same authority, the extra cost to the producers is from 3 to 5 per cent.

Were tin to become still more expensive or to be unattainable, a coat of pure Para rubber, said an expert, could be used on the copper wire, but this process would increase the price of rubber-covered fully 50 per cent. As yet that branch of the industry has not been called upon to meet this emergency. The concern in question supplies a majority of the rubber-covering factories with tinned wire. For lack of sufficient tinned stock a number of these plants have already been obliged to close down. Tin is also extensively used in certain grades of trolley wire. For weatherproof wire employed in the neighborhood of acid or other factories, where the presence of sulphur fumes corrodes and destroys the insulation, the core is likewise submitted to a tinning bath.

Wherever solder is utilized tin is an important element. The metal is also employed in everything of brass, bronze, phosphor-bronze, babbitt metal for journal bearings, and in other alloys known to power-house plants and in the traction railway activities trade. It is the general belief, therefore, among producers of merchandise in

which tin is a factor that, while current prices have not yet been revised on account of the shortage, discussion along these lines is arousing unusual interest and serious attention.

## Transportation Checks Pole Deliveries

**Shortage in East of 35-ft. Size—Advance Reported on Pins and Brackets**

Reports this week on the market condition of wood poles and crossarms reveal marked differences in different parts of the country.

In the East sizes of about 35 ft., which is the popular length, of chestnut are difficult to obtain. The demand is steady but shipments are checked by embargoes. Utilities are in the market for their spring requirements in replacement and maintenance work.

From the Pacific Coast, however, there is a different report. There the pole business is reported to be in a most abnormal and unsettled state, suffering from the rather unusual combination of slack demand and difficult deliveries. This situation may be explained by the shortage of available power and the present high cost of construction material. On the other hand, the pole yards are situated in the Pacific Northwest, where a great deal of government lumber is requisitioned. Cars and boats are difficult to get and labor is almost impossible to secure, and then only at high wages. One of the large pole companies states that when it is fortunate enough to secure a boat for deliveries along the Pacific Coast it is customary to load it with everything available, instead of proportioned stocks, and thus pole stocks are spotty and poorly distributed. Crossarms, of course, are affected by the conditions noted above, with the addition that the forests in which they are cut contain lumber that is valuable for governmental purposes and demands the attention of all available labor, making slow deliveries.

An advance of about 10 per cent on pins and brackets, it is reported from the Middle West, has been scheduled. Shortage of material is given as the cause for the increase.

## Steel As Related to Galvanizing

The Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., has issued a report on a "Metallurgical Study of the Steel Base as related to Galvanizing," by G. A. White, metallurgical engineer. Some of the conclusions reached by this treatise are that steels containing a large amount of oxide and high in manganese or manganese sulphide will galvanize with a large number of small spangles, whereas steels high in manganese, manganese sul-

phide, sulphur and phosphorus but free from dissolved gases and oxides will galvanize with bright spangles; also that the factors active in the production of small granular spangles have their origin in the open-hearth process and these causes can be eliminated only when sufficient care is taken to produce a steel substantially free from oxide. The steel on which Mr. White's tests were made was from three of a total of twenty heats, on each case the heat was tapped into two ladles, the steel in one ladle being treated with ferro-carbon-titanium, while the other received the standard open-hearth process.

## New Iron and Steel Prices

Dating from April 1 the new iron and steel prices, established by the War Industries Board, with the approval of the President, went into effect. The changes to miners in force for three months, were comparatively few, now making basic pig iron \$32 per ton and \$32.50 for Bessemer. Foundry is left at \$33, while malleable remains at \$33.50. A reduction of \$1 a gross ton is made on all prices of scrap, both base grade and differentials. Heavy steel melting scrap is thus quoted at \$29.

## Rolling Stock

Brooklyn (N. Y.) Rapid Transit Company, which intended opening bids for 50 new center-entrance train cars on April 1, as referred to in the *ELECTRIC RAILWAY JOURNAL* of March 23, has postponed action until April 11.

Monroe (La.) Street Railway, municipally owned, is reported as about to buy four rebuilt cars from the Shreveport (La.) Railways. They are of the one man type, with two seating twenty-eight passengers, offered at \$3,000 each, and two of thirty-two seating capacity at \$3,500 each. It is stated that new cars of this kind will now cost \$6,250.

Trenton & Mercer County Traction Corporation, Trenton, N. J., is having expert mechanics from the J. G. Brill Company rebuild the cars damaged by fire on Dec. 15 last, as mentioned in the *ELECTRIC RAILWAY JOURNAL* at the time. They will soon be ready for service. The company has scrapped and sold several of its old cars.

Hudson & Manhattan Railroad, New York, N. Y., operating the Hudson River tubes and connecting systems, according to advices from Washington appearing in the daily newspapers, will extend its lines to the Port Newark Terminal, N. J. Plans to that end were announced on Tuesday by A. L. Drum, transportation engineer of the United States Shipping Board. The cost of the work is estimated at \$3,500,000, and it will begin at once and be seeped up so that trains will be running within three months. Specifications for sixty new all-steel cars are in the hands of the company.



Trade Notes

Westinghouse Air Brake Company this week posted a notice at its Swissvale and Wilmerding plants that an increase of 12½ per cent. has been given the employees.

Gurney Ball Bearing Company, Jamestown, N. Y., is equipping the entire rolling stock of the Third Avenue Railway, New York, N. Y., with its ball-bearing car journal boxes. The work is now under way.

American Chamber of Commerce, City of Mexico, Mexico, has issued the first number of the Journal of the American Chamber of Commerce. It is illustrated and contains information of interest to manufacturers desiring to market their products or better their trade connections in Mexico.

Vulcan Soot Cleaner Sales Company, Chicago, Ill., has transferred to Dubois, Pa., its general sales office, with G. L. Simonds in charge. This is only a change in location to bring the sales, factories and engineers in immediate touch, with the idea of giving better service to all; the personnel remains as before.

W. O. Duntley, president of the Chicago, (Ill.) Pneumatic Tool Company, announced his resignation on March 29, to take place the same date. Mr. Duntley gave as a reason for his resignation a desire to be relieved of the work of actively managing the concern and to devote more time to private business.

Homestead (Pa.) Valve Manufacturing Company has opened a branch office at 1 Franklin Street, New York City.

Charles Remilius has become connected with R. R. Nelson & Co., Newark, N. J., as consulting engineer for them on electric railway equipment and railway properties. Mr. Remilius has had an extended experience with operating properties in Brooklyn and other cities.

Cutler-Hammer Manufacturing Company, Milwaukee, Wis., to insure service and every possible assistance to the various departments of the United States government, has arranged to station H. W. Knowles of its New York office permanently in Washington for the period of the war. The Washington branch will be at the Bradford, Eighteenth and K Streets.

National Conduit & Cable Company, New York, N. Y., at a meeting of the directors recently elected George J. Jackson president, to succeed Edward S. Perot, and Norton A. Howard, formerly secretary, was chosen vice-president, to take the place of Edward S. Perot, Jr. H. J. Pritchard, formerly treasurer, was elected secretary and treasurer to succeed Mr. Howard.

Economy Electric Devices Company of Chicago has received from the Chicago, North Shore & Milwaukee Railroad an order for Sangamo Economy railway meters with which to equip all of its motor cars. This railway property, which operates a high-speed double-track line between Milwaukee and the north limits of Chicago, is controlled by the officials of the Chicago Elevated Railways.

New Advertising Literature

W. N. Matthews & Brother, Inc., St. Louis, Mo.: One-page circular entitled "Labor Conservation." The circular explains the use and shows illustrations of the Matthews wire and cable clamps.

General Electric Company, Schenectady, N. Y.: Index to the company's descriptive bulletins and sheets, also a separate index to supply part bulletins brought up to Jan. 1, 1918. Both of these publications deal with railway equipment, machinery, apparatus and specialties.

C. H. Wheeler Manufacturing Company, Philadelphia, Pa.: Booklet entitled the "Radojet Air Pump." The bulletin is well illustrated, giving the outside views of various size injector-type pumps and showing the application of the so-called air "pump" in a power plant. The general arrangement of the piping system for air removal from condenser, etc., is also shown. Steam tables are included.

Joseph Dixon Crucible Company, Jersey City, N. J.: "Brushes for Your Motor," a new electrical booklet, which tells the story of graphite brushes. The two center pages are devoted to an arrangement of prices and sizes so that the cost of any size brush may be found in a minute. There are also rules as to how to order graphite brushes. Other graphite electrical specialties such as resistance rods and lubricating rods are shown and described.

NEW YORK METAL MARKET PRICES

	March 27	April 3
Copper, ingots, cents per lb.	23½	23½
Copper wire base, cents per lb.	26½ to 26½	26½ to 26½
Lead, cents per lb.	7½	7.20
Nickel, cents per lb.	50	50
Spelter, cents per lb.	7½	7½
Tin, Straits, cents per lb.	*85	*85
Aluminum, 98 to 99 per cent., cents per lb.	*32.10	*32.10

\* Government price in 50-ton lots, f.o.b. plant.

OLD METAL PRICES—NEW YORK

	March 27	April 3
Heavy copper, cents per lb.	22	22
Light copper, cents per lb.	19½	19½
Red brass, cents per lb.	18	18
Yellow brass, cents per lb.	13	13
Lead, heavy, cents per lb.	6.375	6½
Zinc, cents per lb.	5½	5½
Steel car axles, Chicago, per net ton	42.41	42.41
Old carwheels, Chicago, per gross ton	30.00	30.00
Steel rails (scrap), Chicago, per gross ton	35.00	35.00
Steel rails (relaying), Chicago, gross ton	60.00	60.00
Machine shop turnings, Chicago, net ton	17.00	17.00

ELECTRIC RAILWAY MATERIAL PRICES

	March 27	April 3		March 27	April 3
Rubber-covered wire Base, New York, cents per lb.	27 to 30	27 to 30	Car window glass (single strength), first three brackets, A quality, New York, discount.	80% to 82-3%	80% to 82-3%
Weatherproof wire (100 lb. lots), cents per lb., New York.	28½ to 34½	28½ to 34½	Car window glass (single strength, first three brackets, B quality), New York, discount.	79%	79%
Weatherproof wire (100 lb. lots), cents per lb., Chicago.	33.42 to 38.35	33.42 to 38.35	Car window glass (double strength, all sizes AA quality), New York discount.	80%	80%
T rails (A. S. C. E. Standard), per gross ton	\$70.00 to \$80.00	\$70.00 to \$80.00	Waste, wool (according to grade), cents per lb.	11½ to 22	11½ to 22
T-rails, high (Shanghai), cents per lb.	4½	4½	Waste, cotton (100 lb. bale), cents per lb.	12½ to 13	12½ to 13
Rails, girder (ground), cents per lb.	4½	4½	Asphalt, hot (150 tons minimum), per ton delivered	\$38	\$38
Wire nails, Pittsburgh, cents per lb.	3½	3½	Asphalt, cold (150 tons minimum, pkgs. weighed in, F. O. B. plant, Warner, N. J.), per ton	\$42	\$42
Railroad spikes, drive, Pittsburgh, base cents per lb.	4½	4½	Asphalt, filler, per ton	\$45	\$45
Railroad spikes, screw, Pittsburgh base, cents per lb.	8	8	Cement (carload lots), New York, per bbl.	\$2.65	\$2.65
Tie plates (flat type), cents per lb.	*3½	*3½	Cement (carload lots), Chicago, per bbl.	\$2.71	\$2.71
Tie plates (brace type), cents per lb.	*3½	*3½	Cement (carload lots), Seattle, per bbl.	\$3.05	\$3.05
Tie rods, Pittsburgh base, cents per lb.	8	8	Linseed oil (raw, 5 bbl. lots), New York, per gal.	\$1.57	\$1.59
Fish plates, cents per lb.	*3½	*3½	Linseed oil (boiled, 5 bbl. lots), New York, per gal.	\$1.59	\$1.60
Angle plates, cents per lb.	*3½	*3½	White lead (100 lb. keg), New York, cents per lb.	10	10
Angle bars, cents per lb.	*3½	*3½	Turpentine (bbl. lots), New York, cents per gal.	44½	42½
Rail bolts and nuts, Pittsburgh base, cents per lb.	4.90	4.90			
Steel bars, Pittsburgh, cents per lb.	5	5			
Sheet iron, black (24 gage), Pittsburgh, cents per lb.	4.90	4.90			
Sheet iron, galvanized (24 gage), Pittsburgh, cents per lb.	5.80	5.80			
Galvanized barbed wire, Pittsburgh, cents per lb.	4.35	4.35			
Galvanized wire, ordinary, Pittsburgh, cents per lb.	3.95	3.95			

\* Government price.





# Peacock

## The Brake of the Michigan Railways City—Suburban—Interurban

**W**ITHIN the extensive territory of the Michigan Railways will be found every conceivable range of railway service from the tiny town to the speediest interurbans.

Nevertheless, for each kind of service the company has found the Peacock Brake safe to use, easy to operate and cheap to maintain.

The experience of the Michigan Railways is simply another proof that there is a Peacock Brake for every service.

If you will ask us we will be glad to suggest just the right kind, as there is no need to use too powerful a brake when a lighter, cheaper one will actually be more serviceable.

**National Brake Co.**  
Buffalo, N. Y.



The Eccentric  
Drum

# Bankers and Engineers

## The Coal & Iron National Bank of the City of New York

Capital, Surplus & Profits \$1,635,000  
Resources Nearly \$10,000,000

Offers to dealers every facility of a New York  
Clearing House Bank.

## THE J. G. WHITE COMPANIES

ENGINEERS  
FINANCIERS



CONTRACTORS  
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43 EXCHANGE PLACE . . . . . NEW YORK  
LONDON CHICAGO

## SANDERSON & PORTER ENGINEERS

REPORTS • DESIGNS • CONSTRUCTION • MANAGEMENT  
HYDRO-ELECTRIC DEVELOPMENTS

RAILWAY, LIGHT AND POWER PROPERTIES  
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ENGINEERS—CONSTRUCTORS  
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WORCESTER POLYTECHNIC INSTITUTE  
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Industrial Plants and Buildings, Steam Power Stations,  
Water Power Developments, Substations, Gas Plants,  
Transmission Lines, Electric and Steam Railroad Work.  
NEW YORK BOSTON CHICAGO

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Trinity Bldg. No. 208 So. La Salle St. Washington  
Purchase, Finance, Construct and Operate Electric Light,  
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Examination and reports. Utility Securities Bought and Sold.

A. L. DRUM & COMPANY  
CONSULTING AND CONSTRUCTING ENGINEERS  
VALUATIONS AND FINANCIAL REPORTS  
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Financial Investigations and Rate Adjustments

## Sloan, Huddle, Feustel & Freeman Consulting Engineers

Analytical Studies of financial and operating conditions,  
appraisals and rate adjustments of electric railway and  
all public utility properties.

BOSTON, 14 Kilby Street CHICAGO, Conway Bldg.

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## JOHN A. BEELER

OPERATING AND RATE INVESTIGATIONS  
TRAFFIC SURVEYS AND SCHEDULES  
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AVE. ENGINEERING Washington,  
NEW YORK APPRAISALS D. C.

Scofield Engineering Co. Consulting Engineers  
POWER STATIONS PHILADELPHIA, PA.  
HYDRAULIC DEVELOPMENTS GAS WORKS  
ELECTRIC RAILWAYS

ELECTRICAL TESTING LABORATORIES  
Electrical, Photometrical and  
Mechanical Testing.  
80th Street and East End Ave., New York, N. Y.

## THE P. EDW. WISCH SERVICE

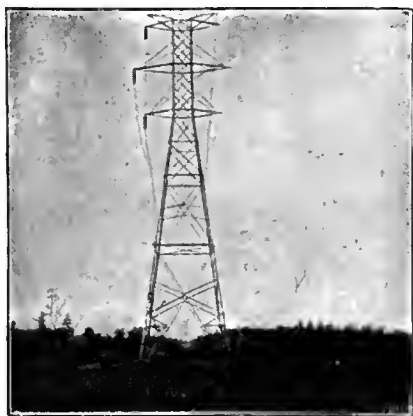
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SARGENT & LUNDY, Engineers  
1412 Edison Bldg., 72 W. Adams St., Chicago, Ill.

# AMERICAN BRIDGE COMPANY

HUDSON TERMINAL-30 CHURCH STREET, NEW YORK

*Manufacturers of Steel Structures of all classes particularly* **BRIDGES AND BUILDINGS**



Transmission Towers at Birmingham, Ala., Alabama Power Company

## SALES OFFICES

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Philadelphia, Pa., Widener Building	Denver, Colo., First Nat'l Bank Building
Boston, Mass., John Hancock Bldg.	Salt Lake City, Utah, Walker Bank Bldg.
Baltimore, Md., Continental Trust Bldg.	Duluth, Minn., Wolvin Building
PITTSBURGH, PA., Frick Building	Minneapolis, Minn., 7th Ave & 2nd St. S. E.
Buffalo, N. Y., Marine National Bank	
Cincinnati, Ohio, Union Trust Building	Pacific Coast Representative:
Atlanta, Ga., Candler Building	U. S. Steel Products Co. Pacific Coast Dept.
Cleveland, Ohio, Guardian Building	SAN FRANCISCO, CAL., Rialto Building
Detroit, Mich., Beecher Ave. & M. C. R. R.	Portland, Ore., Selling Building
CHICAGO, ILL., 208 South La Salle St.	Seattle, Wash., 4th Ave. So. Cor. Conn. St.

## Export Representative:

United States Steel Products Co., 30 Church St., N. Y.

# LIBERTY BONDS

## ARE UNITED STATES GOVERNMENT BONDS

**S**ECURED by all the property and resources of the greatest and richest nation in the world. Invest in them as a safe investment, and at the same time help your country win the war, which it must win if your property is to be worth much of anything to you.

*For your country's sake, and for your own sake,  
buy all the Liberty Bonds you possibly can.*

LIBERTY LOAN COMMITTEE, 120 BROADWAY, NEW YORK

*Second Federal Reserve District*

The Chipman Chemical Engineering Co., Inc.  
Sellers of the Atlas "A" Method of Track Weeding.



# Why

## Good Men Leave



Hand-pumped cars make the section-men's work unduly laborious and unfit them for efficient efforts.

These men are naturally attracted to railroads which use motor-driven section cars.

The existing unprecedented shortage of labor demands the fullest use of labor-saving devices.

**MUDGE MOTOR CARS**  
will do much to solve your  
Labor Problems

# Why

## Good Men Stay



Mudge Motor Cars land your men at the point of work, fresh to start the day's labor.

Mudge Motor Cars enable your men to remain on the job until the last moment, when they are returned home without fatigue.

The proof that Mudge Cars satisfy is to be found in the great number of roads using them.

**MUDGE MOTOR CARS**  
will do much to solve your  
Labor Problems

# MUDGE MOTOR CARS

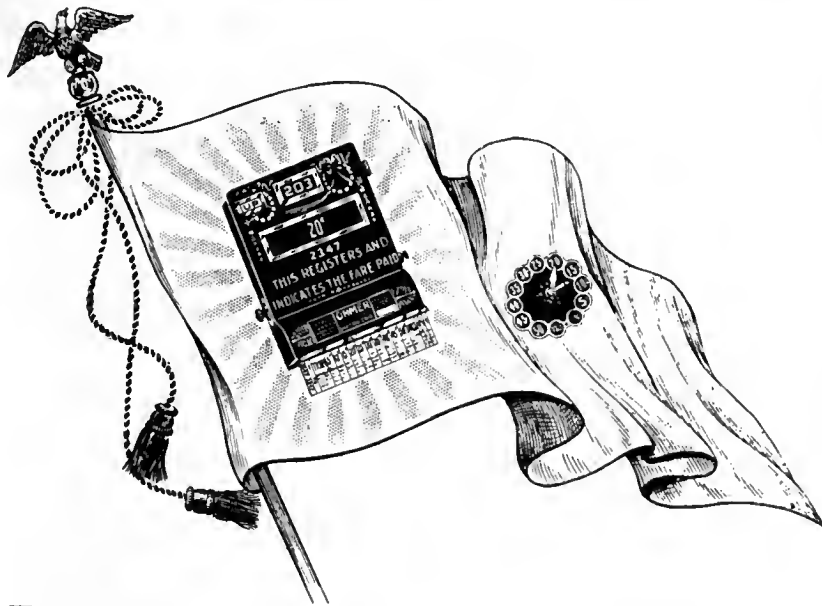


**Mudge & Company**

463 Railway Exchange,

Chicago, Ill.





# The Ohmer System a Wartime Measure

The Ohmer System stands for economy. It is a proper wartime measure for the successful and profitable operation of electric railways. The Ohmer System gives thorough fare protection. Its cost to the user is small.

The Ohmer Fare Register, which is the basis of the Ohmer System, makes possible really effective fare protection. Mechanical accuracy and durability have always been considered of first importance in its construction. It is fool proof. It is shipped from our factory with the O. K. of the most thorough of testing departments. It is installed by our own skilled mechanics and it is maintained by us. We do all this so that our patrons may be absolutely sure that their business with us will be more than justified. We do not sell you a machine, but we do sell you service. We become your consulting experts on all matters pertaining to fare protection. We are specialists in this line and during our many years of experience we have met and solved a great many problems. Let us solve yours.

**OHMER FARE REGISTER COMPANY**  
DAYTON, OHIO



# Hale and Kilburn

## Pioneer No. 400 Walkover Seat

### Girdles the Globe Four Times

*and not a cent for maintenance*

In June, 1915 one of our customers, confident in the seating experience of Hale and Kilburn installed the No. 400 seat just developed.

From time to time he has sent us mileage records and other data on these seats from which it appears that they have made nearly



100,000 Miles  
to Date



With constantly improving action and with no breakages or replacements of any kind, for a distance equivalent to four times the circumference of the earth.

This record offers a typical illustration of the **strength** and **durability** of the H and K No. 400, aside from such

other features as all-steel parts, longer cushion for given over-all length, ease of operation and neat appearance.

Hale and Kilburn experience, stability and correctness in seat manufacture can show to no better advantage than such a record of an entirely new product.



## Hale and Kilburn Corp.

Philadelphia  
Washington

New York  
Atlanta  
Chicago

San Francisco  
Louisville





International Motor-Driven Station Registers at the Grounds of the Boston Braves

Winter traffic troubles are gone, but Spring and Summer offer problems of their own—

Not only the rapid, comfortable loading of crowds at baseball, fair and

picnic grounds; but also 100 per cent. fare collection.

The only way to get these desirable results is to use prepayment areas in conjunction with

## INTERNATIONAL Motor-Driven Station Registers

These registers will pass hundreds of people a minute so that the cars can be loaded and sent off on an amazingly short headway, while the conductors can attend to the safety and comfort of the passengers instead of slowing up the service in the vain attempt to get

all the fares. Prepayment areas with International Motor-Driven Station Registers also offer the ideal all-the-year way of handling traffic from big factories. May we analyze their possibilities for your city?

### THE INTERNATIONAL REGISTER COMPANY

15 South Throop St., Chicago

Manufacturers of Coin Registers, Fare Boxes, Double and Single Car Registers and Fittings, Conductors' Punches and exclusive agents for Heeren Enamel Badges.



# There are Gear Cases and Gear Cases



## But:

Columbia-made gear cases, whether sheet steel or malleable iron, have proved to be the kind that many railways buy exclusively.

It's not because of reasonable prices alone, by a long shot.

It's because Columbia-made gear cases (steel or malleable iron) are good cases, built to withstand bumping over poor paving, dragging over snow, and to prevent fracture at suspension points and the intrusion of dust and mud.

All that our customers and we have learned about gear case waywardness and troubles has gone to make Columbia-made gear cases better all the time.

And do you know about other Columbia-made specialties? Below are a few but don't forget that if it's anything of metal we're ready to make it for you!

## Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St.

Brooklyn, N. Y.

W. R. Kerschner Co., Inc., N. Y.  
Holden & White, Inc., Chicago  
F. F. Bodler, San Francisco  
Railway & Power Eng. Corp., Ltd., Toronto, Can.

### TOOLS

Armature and Axle Straighteners  
Armature shaft straighteners  
Armature buggies and stands  
Babbitting molds  
Banding and heading machines  
Car hoists  
Car replacers  
Coil taping machines for armature leads  
Coil winding machines  
Pinion pullers  
Pit jacks  
Signal or target switches  
Tension stands

### CAR EQUIPMENT

Armature and Axle Bearings  
Armature and field coils  
Bearings (Axle and Armature)  
Brush-holders and brush-holder springs  
Brake, door and other handles  
Brake forgings, riggings, etc.  
Car trimmings  
Commutators  
Controller handles  
Forgings of all kinds  
Gear cases (steel or mall. iron)  
Grid resistors  
Third-rail shoe beams and accessories  
Trolley poles (steel) and wheels










**HELP OUR TOWN  
WIN THE RIGHT  
TO FLY THIS FLAG**

**HONOR FLAG  
3<sup>rd</sup>  
LIBERTY LOAN**

**AWARDED BY THE UNITED STATES TREASURY  
DEPARTMENT TO TOWNS EXCEEDING THEIR QUOTA**

# Street Cars Telling the Message of the Liberty Loan Flag

**A**BOVE is reproduced in one color the street car card featuring the Official Flag of the Third Liberty Loan. This Honor Flag is awarded by the United States Treasury Department to towns exceeding their quota.

  
  
  
The contributing car advertising companies were pleased to have their medium selected to herald this scheme to the people of the United States, several days in advance of the Loan. On the opening day of the Loan this flag card was replaced by a series of other cards making a stirring patriotic appeal.

  
  
  
  
**Barron & Collier**  
**INCORPORATED**

Candler Bldg.  
220 W. 42nd Street, New York City



## The Wonderful Single-Service Chilled-Iron Wheel

# Standard for 67 Years

The Chilled Iron Wheel has performed its every function at a minimum cost.

### *For Freight Cars*

95% of all cars in this type of service are carried on Chilled Iron Wheels.

### *For Street Cars*

The Chilled Iron Wheel is Standard for Street Car Service in 95 out of 100 cities in the United States and Canada, operating 100 cars or over.

### *The Conclusion*

to be gained from these figures is that the Chilled Iron Wheel gives the Greatest Service for the Lowest Cost.

Association of Manufacturers of Chilled Car Wheels  
1228 McCormick Building, Chicago, Ill.

Representing Forty-eight Wheel Foundries Throughout the United States and Canada. Capacity 20,000 Chilled Iron Wheels Per Day.







## The Standard for Rubber Insulation

Railway Feed Wires insulated with OKONITE are unequalled for flexibility, durability, and efficiency and are in use by the leading Electric Street Railway Companies. OKONITE is preferred above any other insulation for Car Wiring, Telegraph and Telephone Purposes.

OKONITE WIRES—OKONITE TAPE  
MANSON TAPE—CANDEE WEATHERPROOF WIRES  
CANDEE PATENTED POTHEADS

*Samples and Estimates on Application*

**THE OKONITE COMPANY, 501 Fifth Ave., cor. 42nd St., New York**

CENTRAL ELECTRIC CO., Chicago, Ill., General Western Agents

F. D. Lawrence Electric Co., Cincinnati, O.

Novelty Electric Co., Philadelphia, Pa.

Pettingell-Andrews Co., Boston, Mass.



## You Can Minimize Overhead Repair Work

and successfully cut maintenance costs if you turn to

## The Macallen Line

of strain insulators, hangers, splicing ears, crossings, and other overhead material.

They are "specialty" products, designed and built to make "Macallen" the standard on American railways.

It will pay you to write for information and prices.

## The Macallen Insulating Joint

Adopted by principal air brake manufacturers as part of their standard equipment. Also insulates steam pipes, etc. Shell is seamless drawn steel, nipples are machined from steel rod, and insulating material is Macallen Vulcanite Compound, not affected by heat or oil—practically indestructible.

May We Send Our Catalog?



**The Macallen Company**  
Macallen and Foundry Sts., Boston



## DU PONT AMERICAN INDUSTRIES

## Reduce Maintenance Costs

By Adopting Quicker, Cheaper  
and Labor-Saving Methods

With the track and construction crews reduced by the country's call, every labor-saving agency must be employed to enable the work of track-repairing and extension to be accomplished with the remainder of the force.

By the Use of  
Red Cross Explosives

to blast earth, shale and gravel ahead of graders and steam-shovels; to demolish culverts, piers, log and ice-jams; improve drainage conditions; prepare pole and post holes; shatter stumps and boulders, it will be found that Red Cross Explosives are actual labor savers in a very practical manner.

## Lower Your Expenses

by adoption of labor-saving methods based on the extensive experiences of our field forces while investigating the blasting operations required to construct the nation's railways. Tell us your blasting problems—let us help you to reduce your maintenance costs.

E. I. du Pont de Nemours & Co.  
Wilmington, Delaware

NOTE: When in Atlantic City, visit Du Pont Products Store, Boardwalk and Penn. Avenue.



## The Du Pont American Industries Are:

E. I. du Pont de Nemours & Co., Wilmington, Del., Explosives.  
Du Pont Chemical Works, New York, Pyroxylin and Coal Tar Chemicals.  
Du Pont Fabrikoid Co., Wilmington, Del., Leather Substitutes.  
The Arlington Works, 725 Broadway, New York, Ivory Pyralin and Cleanable Collars.  
Harrison Works, Phila., Pa., Paints, Pigments, Acids, Chemicals.  
Du Pont Dye Works, Wilmington, Del., Dyes and Dye Bases.

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Mark X before subject of interest and send with address to Adv. Div. E. I. du Pont de Nemours & Co., Wilmington, Delaware. (El. Ry. Jnl.)

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| <input type="checkbox"/> Blstg. Powder   | <input type="checkbox"/> Com'l Acids  | <input type="checkbox"/> Auto Top M't'l  |
| <input type="checkbox"/> Blstg. Supplies | <input type="checkbox"/> Ethers       | <input type="checkbox"/> Fairfield Cloth |
| <input type="checkbox"/> Sptg. Powder    | <input type="checkbox"/> Solvents     | <input type="checkbox"/> PY-RA-LIN       |
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DU PONT

## ROEBLING WIRES AND CABLES

Wire  
for  
Electric  
Railways

**JOHN A. ROEBLING'S SONS COMPANY**  
TRENTON, NEW JERSEY

Agents: New York, Boston, Chicago, Philadelphia, Pittsburgh, Cleveland, Atlanta, San Francisco, Los Angeles, Seattle, Portland, Ore.

Copyright American Studio

When You Specify Lumber for

# CROSSARMS, TIES,

FENCING, TRUNKING AND CAPPING or any of the hundred and one things that a railway uses lumber for, just bear this important fact in mind:

*The cost of the material is generally a small item as compared with the cost of labor for installing it.*

When you specify and use ALL-HEART

# CYPRESS

*"The Wood Eternal"*

for such purposes you know that it is going to give service for a long time, and that you are *not* going to be up against a continuous big *labor cost* for renewals and replacements.

Of course even Cypress may eventually have to be replaced. Nothing lasts quite forever. But in the long service life you get from Cypress you will have *saved* a lot of labor costs in *maintenance alone*.

Anyway, that's why a number of the biggest railways in the country *insist* on ALL-HEART CYPRESS.

"BUY BY THE CYPRESS ARROW."  
LOOK FOR THIS MARK ON THE END OF  
EVERY BOARD—AND ON EVERY BUNDLE.



*Our data is at your service.*

## SOUTHERN CYPRESS MFR'S ASS'N.

1265 Hibernia Bank Building, New Orleans, La., or  
1265 Heard National Bank Building, Jacksonville, Fla.



Overhead Construction in Mt. Royal Tunnel, Canadian Northern Terminal Electrification, Montreal, Can.  
W. C. Lancaster, Elec. Engr.

## Special Standard Bronze S. S. B. High Strength Trolley Wire

was used in this electrification because, after rigid tests by unbiased engineers and careful comparison of results with similar tests on hard-drawn copper and steel, the superior strength, rust- and wear-resistance of S. S. B. Wire were found to meet every requirement of a service characterized by great extremes of temperature and hard usage.

The clearance in this tunnel is only 16 feet and the messenger cable had to be kept under great tension so as to flatten the catenary and reduce the sag to a minimum. S. S. B. Wire was, therefore, used here for both trolley and messenger.

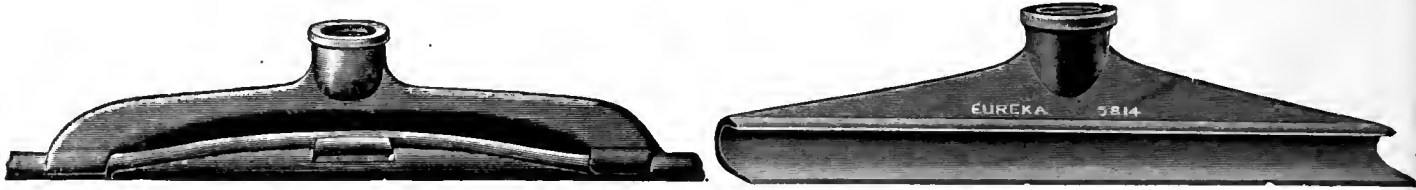
S. S. B. Wire can be supplied in 40 and 60% conductivities as compared with copper. Write our nearest office for samples and prices.

## Standard Underground Cable Co. Pittsburgh, Pa.

Boston, Atlanta, Chicago, Los Angeles, New York, Washington, Detroit, Seattle, Philadelphia, Pittsburgh, St. Louis, Salt Lake City, Minneapolis, San Francisco.

For Canada: Standard Underground Cable Co. of Canada, Ltd., Hamilton, Ont.

# EUREKA EARS



## Some Facts About Them:

**W**E BUY no scrap for melting purposes, but mix all our own metals, thereby assuring uniformity of the mixtures.

The Ears for round wire are cast solid and the grooves are milled accurately and of proper depth to clinch

around the wire, making soldering unnecessary.

When so ordered we also furnish them tinned for soldering to the wire.

Order Eureka Line material and be assured of well designed and carefully made goods.

THE EUREKA CO.  NORTH EAST, PA.

# DOSSERT CONNECTORS

## Used in America's Win-the-War Industries

Look about you in the electric railway field and you will see DOSSERT connectors fulfilling their important duties faithfully and efficiently—just as they are doing in the industrial field from which the great supporting bases of America's armies abroad draw their very life blood.



Dossert Cable Tap

You will find Dossert Connectors in the establishments of the U. S. Engineers in France, in the plants of the Am. Inter. Ship Building Corp., the Submarine Boat Corp., the navy yards at Indian Head, Portsmouth and elsewhere; the arsenals at Watertown, Watervliet, etc.; the various Government embarkation piers and, as in the past, in hundreds of plants in the munitions, lumbering, coal, copper-mining transportation, central stations—and last, but not least, in the power houses of the leading electric railways.

**Dossert & Company, New York**

242 West 41st Street

H. B. LOGAN, President

# RIMCO Rubber Insulated PLIERS

## are the only pliers tested and guaranteed to 10,000 volts



They protect your workmen from the dangers of high-tension work. The Rimco insulation is **semi-soft** and unbreakable—it doesn't crack or break when pliers are dropped from a height onto hard surface.

Rimco Pliers last longer than hard rubber insulation. And they are cheaper than plain pliers with adjustable rubber sleeves.

Why accept less than Rimco's offer for your money?

Ask us for prices.



The Rubber Insulated Metals Corporation  
Plainfield, N. J.

Sole owners of the Elchemco Process for bonding rubber to metals, protected by American and Foreign Patents.

#### SALES AGENTS:

Electric Service Supplies Co.,  
17th and Cambria Sts., Philadelphia, Pa.

National Railway Appliance Co.,  
50 East 42nd St., New York City

Canadian Distributors:

Lyman Tube & Supply Co., Montreal, Toronto, Winnipeg.

# The Name that Stands for QUALITY in Line Equipment



# ANDERSON



Ask for our  
Catalog No. 8

Copy mailed on request

Albert & J. M. Anderson Mfg. Co.  
(Established 1877)

289-293 A Street, Boston, Mass., U. S. A.

#### BRANCHES:

New York, 135 Broadway  
Chicago, 105 So. Dearborn Street

Philadelphia, 429 Real Estate Trust Bldg.  
London, E. C., 48 Milton Street





## TWO MEN Weld a Bond in 40 to 50 Seconds



### With a Lincoln Bonder

This machine can be lifted on and off the tracks in a moment, never interfering with schedules, even on the shortest headway.

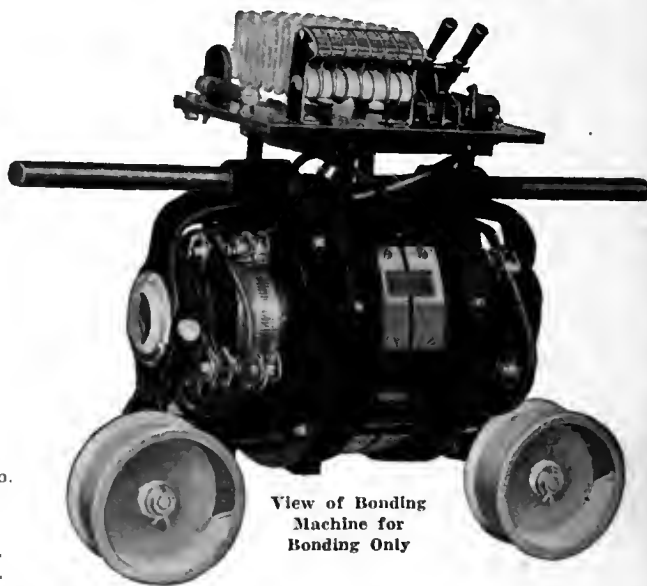
And its weight is so small that two men are not even tired after a full day's work of welding rails.

#### THE LINCOLN BONDING CO.

636 Huron Rd., Cleveland, Ohio

##### AGENTS:

BOSTON	PITTSBURGH	ST. LOUIS
Charles N. Wood Co.	Electrical Engineering & Manufacturing Co.	W. L. Rose Equip. Co.
NEW YORK		MILWAUKEE
Atlantic Welding Co.		W. C. Burdick
PHILADELPHIA	CHICAGO	LOS ANGELES
Railway Track-work Co.	Holden & White, Inc.	Wigmore, Hall & Co.
CANADA:	Lyman Tube & Supply Co., Ltd.	Montreal, Winnipeg.



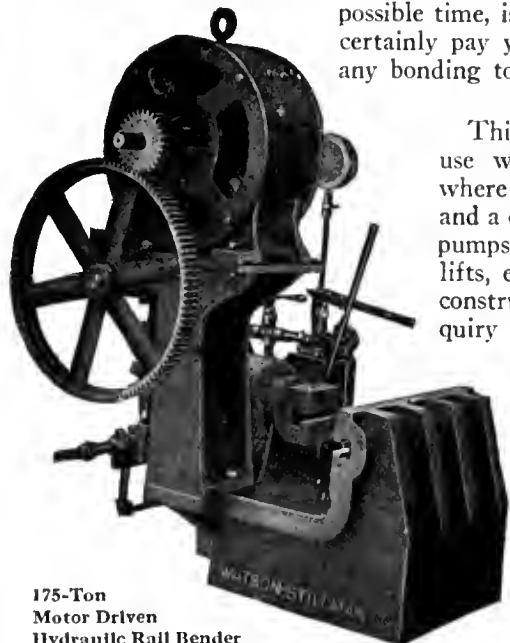
View of Bonding Machine for Bonding Only

## HYDRAULIC TOOLS FOR TRACK MAINTENANCE

Here are two that every electric railway needs.

This RAIL BOND COMPRESSOR does excellent work wherever used. It requires little space, may be placed, operated and removed in the shortest possible time, is positive, durable and efficient. It will certainly pay you to investigate this tool if you have any bonding to do.

Hydraulic Rail Bond Compressor. 35 Tons Capacity



175-Ton  
Motor Driven  
Hydraulic Rail Bender

This is a very economical rail bender for use where electric power is available and where much bending is done. It has a 3½-hp. motor; two-plunger pump, and a capacity of 175 tons. We also make hydraulic jacks, presses, punches, pumps, wheel presses, shears, bulldozers, accumulators, intensifiers, motor lifts, etc. If your needs are special our engineers will gladly advise as to construction and cost of a special machine. We will gladly give your inquiry immediate and careful attention.

Write for catalogs.

### The Watson-Stillman Co.

46 Church St., New York

Chicago, McCormick Bldg.





## The Brand of Satisfaction

Trade marks and brands of quality are guide posts to the purchasing public.

The brands of products that have proved themselves by satisfactory service become known as typifying the STANDARDS in their particular lines.

Just as "sterling" indicates the height of silver quality, so does the SHIELD BRAND distinguish the best tapes.

### Shield Brand Quality Tapes

have been the TAPE STANDARD for many years.

The material and construction are the result of scientific experimentation.

Their unequaled service is the result of painstaking study of tape demands and requirements.

Do you specify the tape with the *brand of satisfaction?*



**United States Rubber Company**  
*Mechanical Goods Division*  
 New York



## ECONOMY

The watchword  
 of the nation—  
 the buyword of the  
 practical fuse user

In all branches of industry—in modern homes, institutions, public buildings—billions of dollars' worth of equipment and property are protected against the fire and accident hazards of overloads and short circuits through the fusing of a million electrical circuits with

## ECONOMY

Renewable

## FUSES

and

### "Drop Out" Renewal Links

The Economy is the pioneer renewable fuse—it hasn't been and won't be duplicated or surpassed. It cuts annual fuse maintenance costs 80%.

If and when means are found of putting more accuracy, safety or satisfaction into a fuse, it will be put into the Economy.

There's no need for tying up a lot of money in a large supply of fuses. A comparatively small quantity of Economy Fuses and "Drop Out" Renewal Links will be plenty.

Experience or special tools are not necessary for anyone to replace the link and renew the fuse. Any novice can do it in a jiffy.

*There's no reason why you shouldn't—and every reason why you should—save that 80%.*

### ECONOMY FUSE & MFG. CO.

Kinzie and Orleans Streets  
 CHICAGO, U. S. A.

*Sole Manufacturers of "ARKLESS"—the Non-Renewable Fuse with the "100% Guaranteed Indicator."*



# Packard

## TRANSFORMERS

regardless of load conditions they show the same high efficiency day after day, doing your work as no other similar product is able to do it and keeping their troubles to themselves.

*It will pay to you write for Bulletin E R J today.*

*The Packard*  
*Electric Company*

Represented by Electric Appliance Co., Chicago, Dallas, New Orleans, San Francisco; Post Glover Electric Co., Cincinnati, Ohio; H. I. Sackett Electric Co., Buffalo, N. Y.; Electric Service Supplies Co., Philadelphia, New York City, Chicago; Charleston Electrical Supply Co., Charleston, W. Va.; Frank Bidion Co., Boston, Mass.; Burton R. Stare, Seattle, Wash.; Braid Electric Co., Nashville, Tenn. District Offices: Los Angeles, Cal., San Fernando Bldg., J. G. Monahan, Mgr.; Denver, Colo., Colorado Nat'l Bank Bldg., Duncan Bond, Mgr.; Detroit, Mich., David Whitney Bldg., W. L. Marsh, Mgr.; Pittsburgh, Pa., 1st Nat'l Bank Bldg., B. Rutherford, Mgr. Export Representatives: S. G. Leach Co., London, E. C.; A. H. Keleher Co., 44 Whitehall St., New York City, N. Y.

Home Offices and Works, Warren, Ohio

MARCH 20, 1918.

### OFFICIAL. DAYLIGHT SAVING BILL SIGNED BY PRESIDENT

All Clocks to be Put Forward an  
Hour on March 31—Benefit  
of the Plan.

WASHINGTON, March 19.—The Daylight Saving bill was signed today by President Wilson. All clocks

JAC  
hata  
rupte  
cred  
& C  
Jud  
celv  
W.  
Strea  
divid  
broad  
of \$  
\$1.7  
an

## Now—more value per hour from your skylight

The daylight bill gives you more light, "Anti-Pluvius" Puttyless skylights make more use of the light you get!

Now you get 100% full-time use of your skylights why not have the one which has 100% full-value light area?

## "ANTI-PLUVIUS" Is Your Best Investment

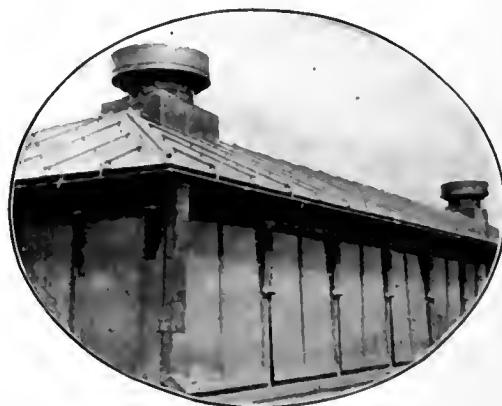
For years "Anti-Pluvius," the Drouvé flood-light roof, has made best use of sunlight by the maximum light area owing to patented all-steel construction.

It is the light which will be of greatest value to you today.

Today is the day to investigate.

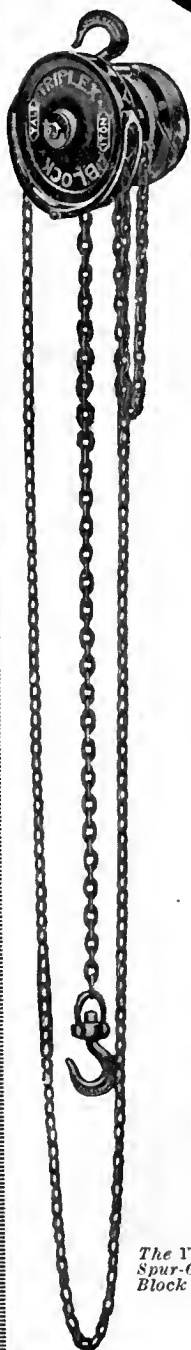
**THE G. DROUVÉ CO.**  
Bridgeport, Conn.

(Also manufacturers of "Straight-Push" Sash Operators.)





Yale Spur-gear Block dismantling car trucks



The Yale Spur-Gear Block

## For Lifting—

### **You need the Yale Spur-gear Block**

In every business there are loads to be handled. This requires speed, economy, capacity and safety.

And no matter what your business may be, no matter what your load problems are, there is a Yale Chain Block to meet the condition.

Yale Spur-gear Blocks,  $\frac{1}{4}$  to 40 tons, are giving satisfactory, dependable service throughout the world under all conditions of use.

Each Yale Spur-gear Block must meet this very exacting test before leaving the factory; it must handle 3360 pounds to the rated ton (50% overload).

The guarantee is in the block itself.

*For Sale by Machinery  
Supply Houses*

Put your hoisting problems up to us  
**ASK FOR NEW CATALOG**

*For factory locking equipment  
use a Yale Master-key System.  
Write us for particulars*

**The Yale & Towne  
Mfg. Co.**  
9 East 40th Street  
New York



Manufactured by the  
**JOHNS - PRATT CO.**  
Hartford, Conn.  
H. W. Johns-Manville Co.  
Sole Selling Agents

## **"NOARK" FUSES— the fuse with a reputation to protect**

THERE never has been so little justification to flirt with safety as today. Taking a chance in normal times, while never justifiable, at least was limited to commercial hazard—but today commercial loss means an economic set-back—an enemy victory right here at home.

A man who takes chances with a fuse, does so wilfully—because there are safe, dependable fuses. These fuses are as sound in design and construction as a precision instrument—and they are fully inspected and labeled by a board of censors whose rulings are always made for the user's side of the case.

"Noark" Fuses conform strictly to the rulings and recommendations of the Underwriters' Laboratories, Inc., after examination under the provisions of the National Electrical Code.

**H. W. JOHNS-MANVILLE CO.**  
NEW YORK CITY  
10 Factories—Branches in 61 Large Cities.

# Johns - Manville

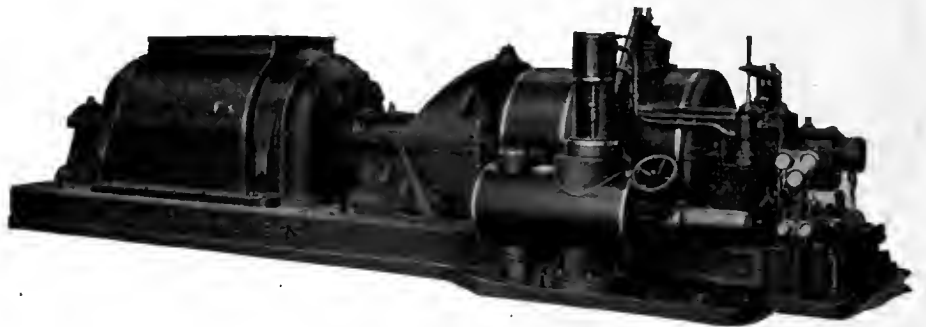
## EFFICIENCY — RELIABILITY — SIMPLICITY

## District Offices

Atlanta, Ga.  
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 Pittsburgh, Pa.  
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 So. America  
 Seattle, Wash.  
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## Allis-Chalmers Steam Turbines

Show sustained economy after years of operation  
 Units built in sizes from 200 kw. up

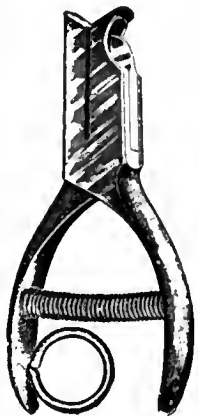


3200 KW., Max. 3600 R.P.M., H.P. Condensing Steam Turbine and Alternator. Unit of this size installed in the plant of the Eastern Pennsylvania Ry. Co., Palo Alto, Pa.

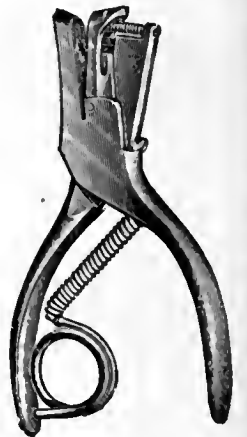
## Allis-Chalmers Manufacturing Co.

Milwaukee, Wis.

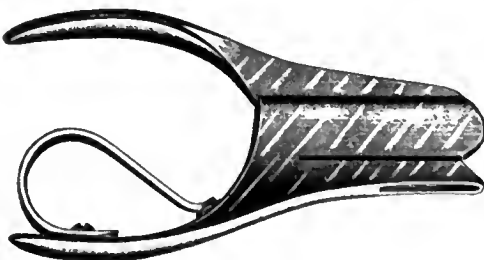
For all Canadian Business refer to Canadian Allis-Chalmers, Ltd., Toronto, Ont., Canada



We Make  
 100 Varieties  
 of Ticket Punches  
 But Only One Quality



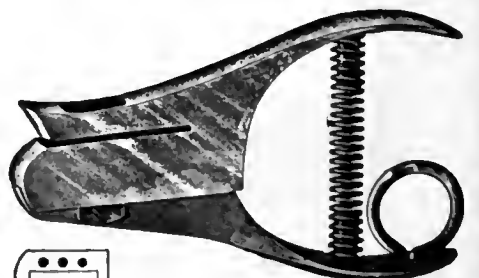
*and that is B-V Quality*



Bonney-  
 Vehslage  
 Tool Co.

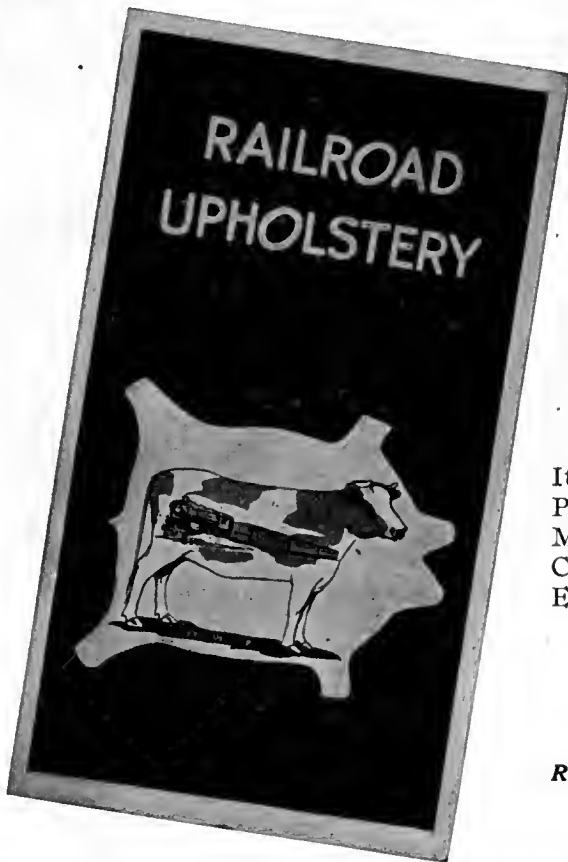
61 New Jersey R.R. Ave.  
 Newark, N. J.

CINCINNATI
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RAMSBURG
DAYTON
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DU PONT AMERICAN INDUSTRIES



## Get This Booklet

It gives up-to-date facts on Railroad Upholstery problems and the experience of one of the foremost railroad men in the country with



It is full of interesting and valuable information for Purchasing Agents, Superintendents of Motive Power, Master Mechanics, Shop Foremen, Car Upholsterers, Car Builders and Officials interested in Railway Equipment.

*Booklet will be sent promptly to all persons requesting it of*

### Wendell & MacDuffie Co.

*Railway Dept. Representatives, DuPont Fabrikoid Co.  
61 Broadway, New York*



Trade-Mark

# BOUND BROOK

Reg. U. S. Pat. Office

## OIL-LESS BEARINGS

are absolutely uniform in composition. Users of these bushings do not hesitate to say that by their installation trolley maintenance and lubrication troubles have been so reduced as to banish the idea of ever abandoning them!



All genuine graphited "Oil-less" Bearings have always been made at Bound Brook, N. J., in the United States of America, by the



### Bound Brook Oil-less Bearing Co.

Formerly The Graphite Lubricating Co.

Canadian Distributors: Lyman Tube & Supply Co., Ltd.  
MONTREAL TORONTO WINNIPEG

# For High Speed Operation

## —Large Diameter Kalamazoo Trolley Wheels



As a solution to arcing and short wheel life on high speed electric railway work, two new Kalamazoo Wheels have been designed.

They are (No. 20) 11½ inches and (No. 21) 10 inches in diameter. An ample increase of width, depth of groove and length of hub insures a well-balanced wheel in each case.

Tests covering considerable mileage at high speeds show that these two new "Kalamazoo's" greatly decrease sparking, while offering longer wheel life. There is more bearing on the wire, with consequent greater contact and current carrying capacity.

The patented Kalamazoo Harps have been enlarged to carry these wheels.

Try several on your lines. Compare their service with that of smaller wheels.

*Write Today.*



## STAR BRASS WORKS

KALAMAZOO, MICHIGAN

# These are BEMIS PRODUCTS

Are you getting the most from them?

**First—**

by using as many of them as you can.

*—If not, let us know.*

**Second—**

by getting the highest service from those you do use.

*If not, let us know.*

Bemis Trucks, Case Hardened Brake Pins, Case Hardened Bushings, Case Hardened Nuts and Bolts — Lord Baltimore Trucks, Manganese Brake Heads, Manganese Transom Plates, Manganese Body Bushings, Bronze Axle Bearings.

**The Bemis Car Truck Co. Springfield, Mass.**

# Raise Your Schedule Speed and Operate Fewer Cars



Better pleased patrons and better profits have always resulted from the installation of

## RAILWAY ROLLER BEARINGS

Big savings in power are made by the decreased friction and the longer wasting periods that naturally follow.

Less oil is required by the inclosed dust-proof and oil-tight design which provides continuous lubrication without waste of oil.

Very easy to mount in your trucks and no trouble to inspect in service. No adjustments are required after installation.

Interesting city, suburban and interurban performance data is available. Shall we send it?

**The Railway  
Roller Bearing Co.**  
Syracuse, New York



## **FMB** Grid Resistors

### ARE MADE RIGHT AND STAY RIGHT

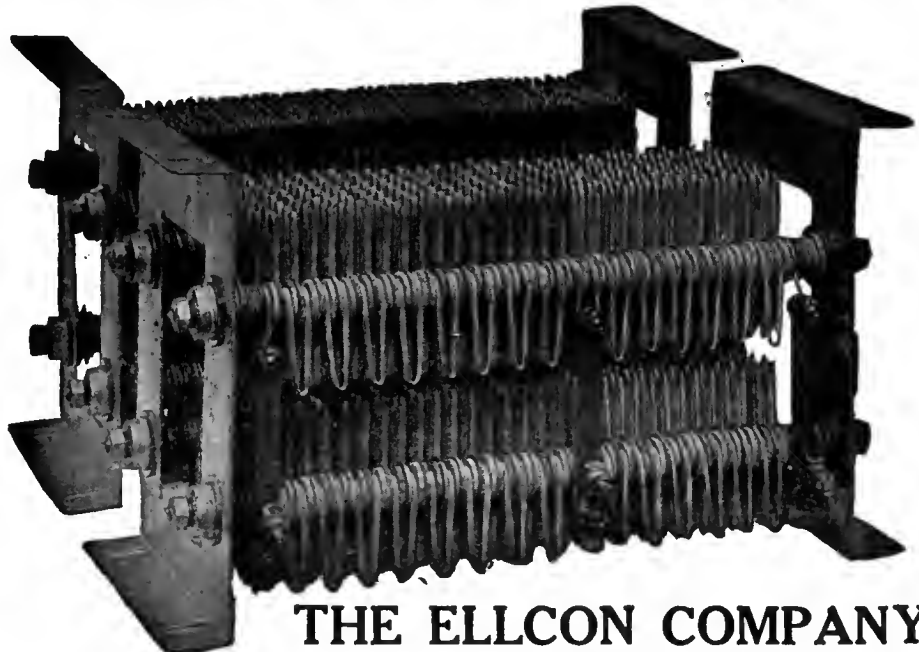
No resistors get more abuse than those under a car.

They are abused electrically by careless operation of the controller.

They are abused mechanically by exposure to dusty, muddy and stone-littered streets.

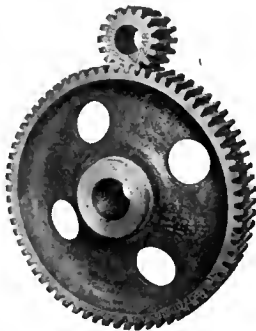
Until the arrival of E M B drawn, non-corroding grid resistors, troubles from these sources seemed unavoidable.

E M B grid resistors actually have made this part of your equipment troubleproof.



**THE ELLCON COMPANY**  
50 Church Street, New York

# On Rendering Dependable Service



INASMUCH as the maximum production of war materials depends largely on the reliability of the means of transportation of the workman to and from his work, your rolling stock must be kept at the highest degree of dependability. Your rolling stock is no more reliable than the appliances that drive it—the gears.

Nuttall B P Treated Railway Gears are guaranteed to last four times as long as untreated cast steel gears in identical service, saving time and cost of new material.

The following table shows the average saving possible through the use of B P Treated Gearing:

*Compare these figures with your present results*

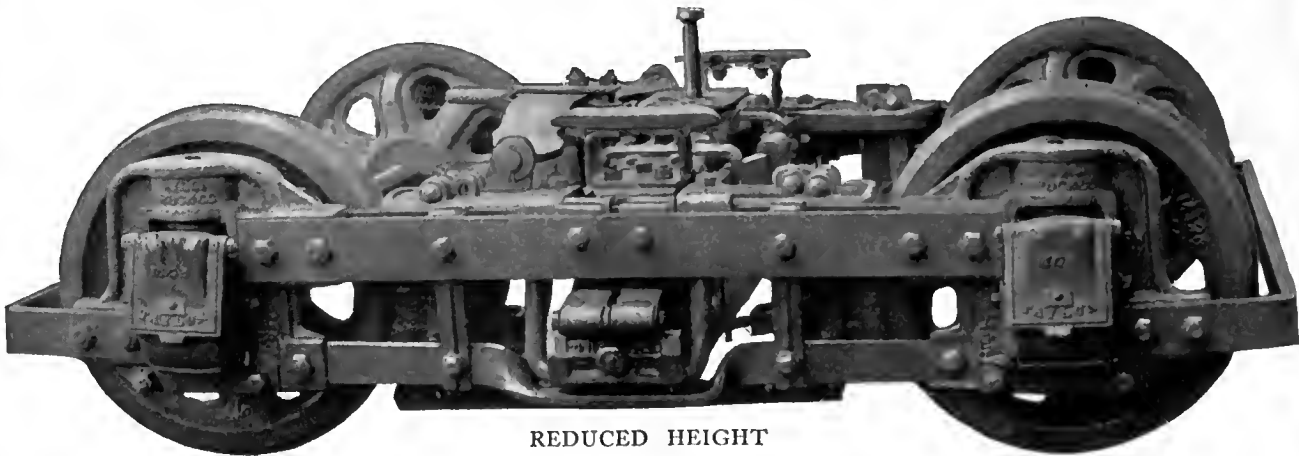
Grade	Relative Service	Relative First Cost	Cost of Cast Steel for Equal Life	Saving In Ultimate Cost
C. S.	100%	100%	100%	
B. P.	350%	130%	350%	63%
		\$30.00	\$ 30.00	\$66.00
		39.00	105.00	



Write today for Heat Treatment of Gears and Bulletin No. 17.

## NUTTALL PITTSBURGH

### R. H. TAYLOR REDUCED HEIGHT TRUCK



REDUCED HEIGHT

### TAYLOR R. H. TRUCK

Mounted on 26-Inch Wheels With Springs Over Journal Boxes  
Designed to Mount Centre and End Entrance Cars Low Down

SWING MOTION AND FULL ELLIPTIC SPRINGS

Wheel Base 5 ft. 2 in. For Car  
Bodies weighing 16,000 to 22,000 lb.  
Motors Inside Hung.

EASY  
RIDING

Journals 3 3/4 x 7 M.C.B. Type.  
Height from Rail to Body Bolster,  
22 3/4 in. Brakes Inside Hung.

## TAYLOR ELECTRIC TRUCK CO., TROY, N.Y.

SPECIFICATIONS ON REQUEST

Established 1892

SEND FOR PORTFOLIO

The new high speed interurban cars recently placed in service by the Jamestown, Westfield & Northwestern Railroad are fitted with Standard No. 1062 rolled steel wheels mounted on Standard axles.

—Representative practice

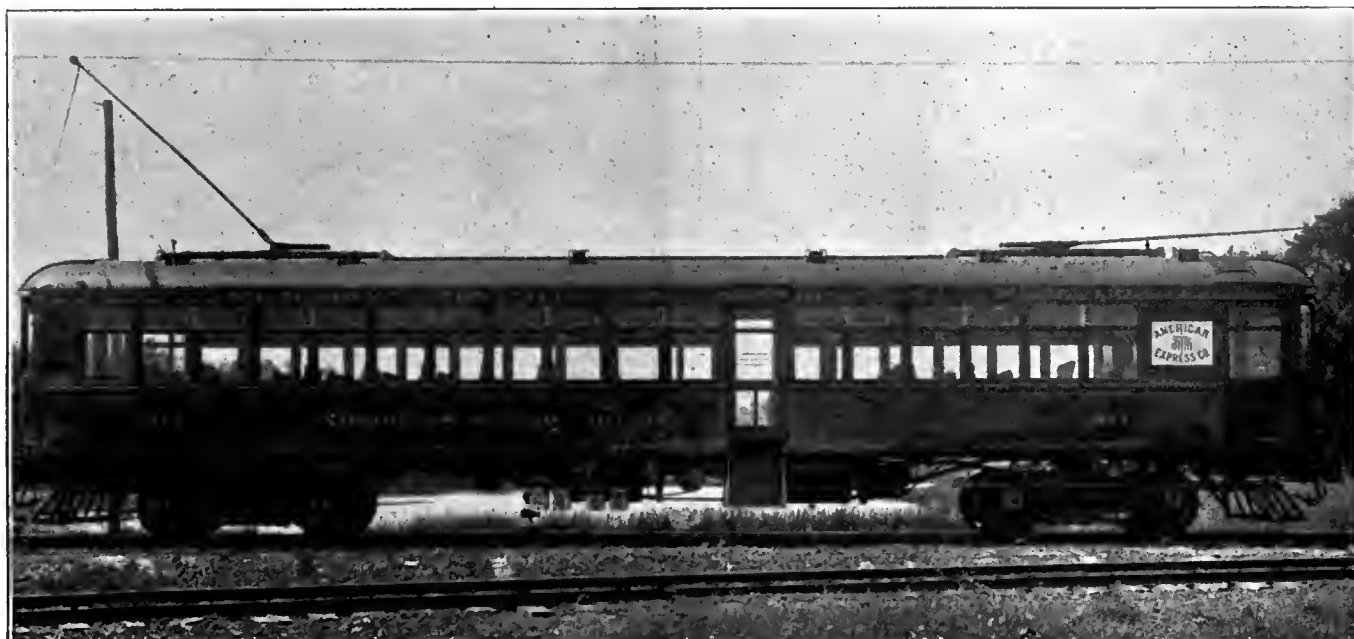


## STANDARD STEEL WORKS CO.

Morris Building, Philadelphia

New York  
Chicago  
St. Louis  
Pittsburgh  
San Francisco  
Richmond

Portland  
Havana, Cuba  
London, Eng.  
Melbourne, Aust.  
Monterey, Mex.  
Mexico City



This man  
received an increase of  
30 per cent. in his salary

—because he had the business judgment  
to announce this want in the Searchlight  
of Electric Railway Journal.

POSITION wanted by young man with  
7 years' experience as armature winder  
and controller man. Best of references.  
Box      Elec. Ry. Jour.

He writes:

"The result from my advertisement in  
the Electric Railway Journal was won-  
derful. I received 8 replies and accepted  
a new position with more than 30 per  
cent increase in salary."

His Ad. ran four times, at a cost of \$2  
Was it worth it?

*Put your Wants in the Searchlight*



## You Are Never in Doubt

when your road is protected by

## Nachod Signals

No matter what your road conditions are, a Nachod  
will take care of them. There are 7 types of  
Nachods for all service, from high speed interur-  
ban to city travel.

Write for information.

*Nachod Spells Safety.*

**NACHOD SIGNAL CO., Inc.**  
Louisville, Ky.

PACIFIC COAST REPRESENTATIVES  
ECCLES & SMITH CO., Portland, Oregon, San Francisco, Cal.,  
Los Angeles, Cal.



## STEEL POLES For Every Pole Purpose



Bates Steel Poles Ornamenting the Approach to the New Wisconsin State Capitol Building, Madison, Wis.

Strongest STEEL POLE of like weight in the world.  
Best STEEL POLE in the world for electric railway trolley service, Power Transmission or Street Lighting.  
Most artistic STEEL POLE in the world for any service.

We make the lowest prices.  
We have constantly on hand about two thousand tons of steel and can make immediate shipments.  
A full line of convenient malleable fittings.

Our steel pole TREATISE tells a big story. Ask for it.

**BATES EXPANDED STEEL TRUSS CO.**  
208 South La Salle St. Chicago, Ill., U. S. A.

## ALUMINUM COMPANY OF AMERICA PITTSBURGH, PA.

Manufacturers of Aluminum, Ingot, Sheet, Tubing, Wire, Rod, Rivets, Moulding, Extruded Shapes, Electrical Conductors

General Sales Office, 2400 Oliver Building, Pittsburgh Pa.

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Chicago.....1500 Westminister Building  
Cleveland.....950 Leader-News Building  
Detroit.....1512 Ford Building  
Kansas City.....308 R. A. Long Building  
New York.....120 Broadway  
Philadelphia.....1216-1218 Widener Building  
Rochester.....1112 Granite Building  
San Francisco.....731 Rialto Building  
Washington.....509 Metropolitan Bank Building

CANADA—Northern Aluminum Co., Ltd., Toronto  
LATIN AMERICA—Aluminum Co. of South America, Pittsburgh, Pa.  
ENGLAND—Northern Aluminium Co., Ltd., London

Send inquiries regarding aluminum in any form to nearest Branch Office, or to General Sales Office.

## FEDERAL SIGNAL CO. ALBANY, N. Y.

CONSULT OUR ENGINEERS ON YOUR  
SIGNAL REQUIREMENTS

52 Vanderbilt Avenue, New York Monadnock Block, Chicago  
118-130 New Montgomery St., San Francisco, Cal.

## TIES

UPPER MICHIGAN WHITE CEDAR

WHITE MARBLE LIME CO., (Cedar Dept.) Maniatique, Mich.

## Archbold Brady Company

Syracuse, N. Y.

### "A" FRAME

transmission structures on 12 mile 66,000 volt line of Keene Gas & Electric Co., from Keene to Marlboro and Dublin, N. H.

Three No. 2 stranded copper conductors with 7/16 steel ground wire.

Standard span, 400 ft.

Maximum, 600 ft.

38 ft. to low wire.

## THE LINDSLEY BROTHERS CO.

Western "Good Poles Quick" Northern

Quick Shipments from our Minneapolis Yard  
Rooms 832-834, 72 West Adams St.  
CHICAGO, ILL.

Spokane — St Louis

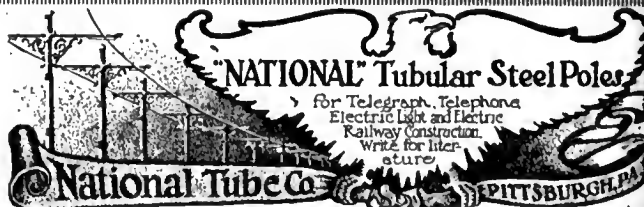
Butt Treating  
Open Tack and  
"Hot and Cold"  
Processes

## Peirce Forged Steel Pins with Sheet Steel Thimbles

Your best insurance against insulator breakage

**Hubbard & Company**

PITTSBURGH, PA.



## POLES WESTERN CEDAR PILING

We brag about the SERVICE we give

**B. J. CARNEY & CO.**

E. B. BRANDE, Manager M. P. FLANNERY, Manager  
519 Broad Street, Grinnell, Ia. Spokane, Wash.  
WM. MULLER & CO., 1729 McCormick Bldg., Chicago.  
Commit us to memory.

**SAFETY**  
For Protection Always  
But we have made

**TURBOIL**  
TRADE MARK  
AND



**GAS  
CYLINDER OIL**

The most popular  
**POWER-HOUSE  
WORDS**

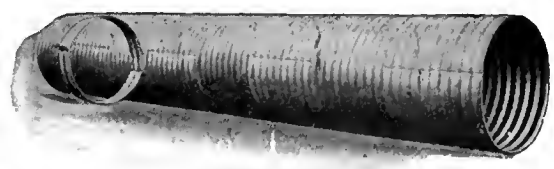
because they carry  
**SAFETY**

**BORNE, SCRYMSER COMPANY**  
80 SOUTH STREET, NEW YORK

**"ACME" (NESTABLE)  
CORRUGATED CULVERTS**

Made of Galvanized Anti-Corrosive NO-CO-RO METAL  
are our leading product and we know they have no superior,  
yet we justify our position as leading manufacturers of cor-  
rugated culverts by producing large quantities of

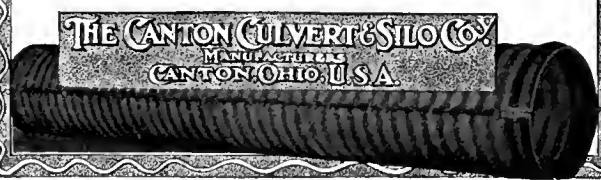
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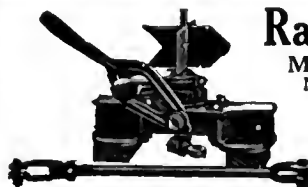
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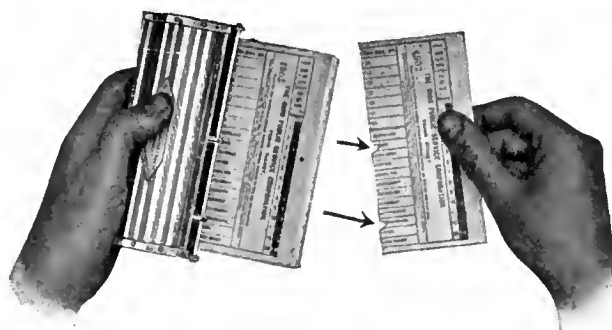
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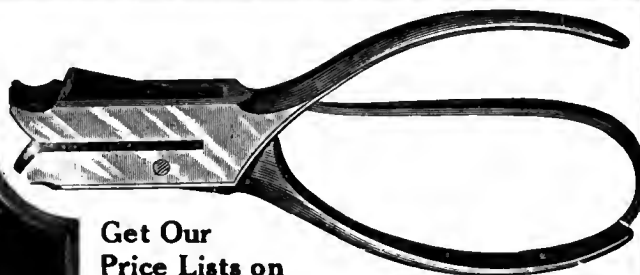


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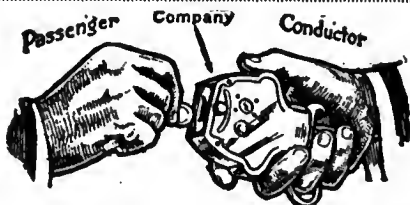
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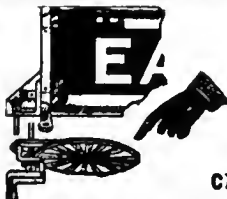
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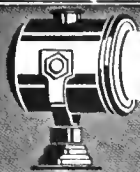


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Miscellaneous



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# SEARCHLIGHT SECTION



Miscellaneous



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50 Church Street, New York

### LEGAL NOTICE

STATEMENT OF THE OWNERSHIP MANAGEMENT, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

of Electric Railway Journal, published weekly at New York, N. Y., for April 1, 1918.

State of New York } ss.  
County of New York }

Before me, a Notary Public in and for the State and County aforesaid, personally appeared Chester W. Dibble, who, having been duly sworn according to law, deposes and says that he is the Office Manager of the McGraw-Hill Company, Inc., Publishers of Electric Railway Journal, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are: Publisher, McGraw-Hill Company, Inc., 10th Ave. at 36th St., New York, N. Y. Editor, Henry W. Blake, 10th Ave. at 36th St., New York, N. Y. Managing Editor, none. Business Manager L. W. Seeligsberg, 10th Ave. at 36th St., New York, N. Y.

2. That the owners are: (Names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) McGraw-Hill Co., Inc., 10th Ave. at 36th St., New York, N. Y. James H. McGraw, 10th Ave. at 36th St., New York, N. Y. Arthur J. Baldwin, 10th Ave. at 36th St., New York, N. Y. Henry W. Blake, 10th Ave. at 36th St., New York, N. Y. Fred R. Low, 10th Ave. at 36th St., New York, N. Y. John McGhie, 10th Ave. at 36th St., New York, N. Y. Fred S. Weatherby, 163 Clinton Road, Brookline, Mass. Hugh M. Wilson, Hotel Belmont, New York, N. Y. Clara H. Roeber, 29 Hal-

### LEGAL NOTICE

sted St., E. Orange, N. J. Imogene Whitteley, Madison, N. J. Leonard D. Baldwin, 27 Pine St., New York, N. Y. Arthur J. Baldwin & Essex Co. Trust Co. Trustees, 10th Ave. at 36th St., New York, N. Y. Arthur J. Baldwin & Leonard D. Baldwin, Trustees, 10th Ave. at 36th St., New York, N. Y. Leonard D. Baldwin & Arthur J. Baldwin, Trustees, 27 Pine St., New York, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

CHESTER W. DIBBLE,  
Office Manager, McGraw-Hill Co., Inc.  
Sworn to and subscribed before me, this 25th day of March, 1918.  
[Seal.] MARTIN J. WIEMER,  
Notary Public Kings County. Certificate filed in New York County, No. 70.  
(My commission expires March 30, 1918.)

### POSITIONS VACANT

- CLAIM agent for city and interurban railway system in the central West; applicant will state age, references, past experience and salary expected to begin. A good opportunity for the right man. P-111, Elec. Ry. Journal, Chicago.
- DRAFTSMAN wanted for master mechanic's office. Must have a fair knowledge of mechanical and electrical work. State age, nationality and salary expected in first letter. An exceptionally good opportunity for right party. P-93, Elec. Ry. Journal, Philadelphia.
- ONE railway armature winder wanted; wages 50c. per hour, and one air brake man. Columbia Ry. Gas & Elec. Co., Columbia, S. C.
- WANTED—working car barn foreman for a small street railway system in Colorado. Man must be familiar with armature winding and competent to do and direct all car barn work. Address P-95, Elec. Ry. Journal, Chicago.
- COMMISSION man to sell Red Cedar Piling and Poles wanted. State experience. P-115, Elec. Ry. Journal, San Francisco.
- WANTED: Two track section foremen. Salary \$90 per month, permanent work. P-105, Elec. Ry. Journal, Philadelphia.
- WANTED: Two experienced track repairmen. Good wages, steady employment. P-106, Elec. Ry. Journal, Philadelphia.

### POSITIONS WANTED

GENERAL manager now employed and in present position for ten years desires to get in touch with a small or medium-sized road desiring the services of an efficient, dependable manager with a thorough knowledge of the electrical and mechanical departments, the handling of freight and express, as well as matters before the various commissions. PW-113, Elec. Ry. Journal, Philadelphia.



# WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry  
with Names of Manufacturers and Distributors

**Advertising, Street Car.**  
Collier, Inc., Barron G.

**Air Cleaners.**  
Horne Mfg. Co.

**Air Rectifiers.**  
Holden & White, Inc.

**Alloys, Steel and Iron. (See also Bearings and Bearing Metals.)**  
Titanium Alloy Mfg. Co.

**Anchors, Guy.**  
Electric Service Supplies Co.  
Holden & White, Inc.  
Ohio Brass Co.  
Western Electric Co.  
Westinghouse Elec. & M. Co.

**Anti-Climbers.**  
Railway Improv. Co.

**Automobiles and Buses.**  
Brill Co., The J. G.

**Axle Straighteners.**  
Columbia M. W. & M. I. Co.

**Axles.**  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Carnegie Steel Co.  
National Railway Appliance Co.  
St. Louis Car Co.  
Standard Steel Works Co.  
Taylor Electric Truck Co.  
Westinghouse Elec. & M. Co.

**Babbitting Devices.**  
Columbia M. W. & M. I. Co.

**Badges and Buttons.**  
American Railway Supply Co.  
Electric Service Supplies Co.  
International Register Co., The.  
Woodman Mfg. & Supply Co., E.

**Bankers and Brokers.**  
Coal & Iron National Bank.

**Batteries, Dry.**  
Johns-Manville Co., H. W.

**Batteries, Storage.**  
Electric Storage Battery Co.

**Bearings and Bearing Metals.**  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
General Electric Co.  
Kerschner Co., Inc., W. R.  
More-Jones Brass & M. Co.  
St. Louis Car Co.  
Taylor Elec. Truck Co.  
Westinghouse Elec. & M. Co.

**Bearings, Center and Roller Slide.**  
Holden & White, Inc.  
Stucki Co., A.

**Bearings, Oil-less, Graphite, Bronze and Wood.**  
Bound Brook Oil-less Bearing Co.

**Bearings, Roller and Ball.**  
Gurney Ball Bearing Co.  
Railway Roller Bearing Co.

**Bells and Gongs.**  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
St. Louis Car Co.

**Benders, Rail.**  
Niles-Bement-Pond Co.  
Watson-Stillman Co.  
Zelnicker Supply Co., W. A.

**Blasting Powder and Equipment.**  
Du Pont de Nemours Co., E. I.

**Boiler Cleaning Compounds.**  
Dearborn Chemical Co.  
Johns-Manville Co., H. W.

**Boiler Coverings.**  
Johns-Manville Co., H. W.

**Boiler Graphite.**  
Dixon Crucible Co., Joseph.

**Boiler Tubes.**  
National Tube Co.

**Boilers.**  
Babcock & Wilcox Co.

**Bond Testers.**  
American Steel & Wire Co.

**Bonding Apparatus.**  
Electric Railway Improv. Co.  
Imperial Brass Mfg. Co.  
Lincoln Bonding Co.  
Ohio Brass Co.

**Bonding Tools.**  
American Steel & Wire Co.  
Electric Railway Improv. Co.  
Electric Service Supplies Co.  
Ohio Brass Co.

**Bonds, Rail.**  
American Steel & Wire Co.  
Electric Railway Improv. Co.  
Electric Service Supplies Co.  
General Electric Co.  
Johns-Manville Co., H. W.  
Lincoln Bonding Co.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

**Boring Tools, Car Wheel.**  
Niles-Bement-Pond Co.

**Braces, Rail.**  
Kilby Frog & Switch Co.

**Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)**  
American Bridge Co.  
Bates Expanded Steel Truss Co.  
Creaghead Engrg. Co.  
Electric Railway Equipment Co.  
Electric Service Supplies Co.  
Hubbard & Co.  
Lindsley Bros. Co.  
Ohio Brass Co.

**Brake Adjusters.**  
Holden & White, Inc.  
Westinghouse Trac. Brake Co.

**Brake Shoes.**  
American Brake S. & Fdy. Co.  
Barbour-Stockwell Co.  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
St. Louis Car Co.  
Taylor Elec. Truck Co.  
Wheel Truing Brakeshoe Co.

**Brakes, Brake Systems and Brake Parts.**  
Allis-Chalmers Mfg. Co.  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Holden & White, Inc.  
Horne Mfg. Co.  
National Brake Co.  
St. Louis Car Co.  
Safety Car Devices Co.  
Taylor Elec. Truck Co.  
Westinghouse Trac. Brake Co.

**Bridges and Buildings.**  
American Bridge Co.

**Brooms, Track, Steel or Rattan.**  
Zelnicker Supply Co., W. A.

**Brushes, Carbon.**  
General Electric Co.  
Jeandron, W. J.  
Morgan Crucible Co.  
United States Graphite Co.  
Westinghouse Elec. & M. Co.

**Brushes, Graphite.**  
Dixon Crucible Co., Jos.  
United States Graphite Co.

**Brush Holders.**  
Anderson Mfg. Co., A. & J. M.  
Eureka Co.

**Bunkers, Coal.**  
American Bridge Co.

**Bushings, Case Hardened Manganeese.**  
Bemis Car Truck Co.

**Bushings, Graphite and Wooden.**  
Bound Brook Oil-less Bearing Co.

**Cables. (See Wires and Cables.)**

**Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)**

**Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)**

**Cars, Dump.**  
Differential Car Co.

**Cars, Section.**  
Mudge & Co.

**Cars, Passenger, Freight, Express, etc.**  
American Car Co.  
Brill Co., The J. G.  
Kuhlman Car Co., G. C.  
McGuire-Cummings Mfg. Co.  
St. Louis Car Co.  
Wason Mfg. Co.

**Cars, Second Hand.**  
Electric Equipment Co.  
Kerschner Co., Inc., W. R.

**Cars, Self-Propelled.**  
Electric Storage Battery Co.  
General Electric Co.

**Castings, Brass, Composition or Copper.**  
Anderson M. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
Horne Mfg. Co.  
More-Jones Brass & M. Co.

**Castings, Gray Iron and Steel.**  
American B. S. & Fdry. Co.  
American Bridge Co.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Horne Mfg. Co.  
St. Louis Car Co.  
Standard Steel Works Co.  
Union Spring & Mfg. Co.

**Castings, Malleable and Brass.**  
American Brake S. & Fdry. Co.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Horne Mfg. Co.  
St. Louis Car Co.

**Catchers and Retrievers, Trolley.**  
Electric Service Supplies Co.  
Holden & White, Inc.  
Horne Mfg. Co.  
Kerschner Co., Inc., W. R.  
Ohio Brass Co.  
Trolley Supply Co.  
Wood Co., C. N.

**Celling, Car.**  
Pantasote Co.

**Checks, Employees.**  
American Railway Supply Co.

**Circuit Breakers.**  
General Electric Co.  
Westinghouse Elec. & M. Co.

**Clamps and Connectors, for Wires and Cables.**  
Anderson Mfg. Co., A. & J. M.  
Electric Service Supplies Co.  
Dossert & Co.  
General Electric Co.  
Hubbard & Co.  
Klein & Sons, M.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

**Cleaners & Scrapers, Track. (See also Snow-Plows, Sweepers and Brooms.)**  
Brill Co., The J. G.  
Ohio Brass Co.

**Clusters & Sockets.**  
General Electric Co.

**Coal and Ash Handling. (See Conveying and Hoisting Machinery.)**

**Coasting Recorders.**  
Railway Improv. Co.

**Coil Banding and Winding Machines.**  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.

**Coils, Armature and Field.**  
Cleveland Armature Works.  
Coil Mfg. & Repair Co.  
Columbia M. W. & M. I. Co.  
D. & W Fuse Co.  
General Electric Co.  
Independent Lamp & Wire Co.  
Westinghouse Elec. & Mfg. Co.

**Coils, Choke & Kieking.**  
Electric Service Supplies Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.

**Coin-Counting Machines.**  
Electric Service Supplies Co.  
International Register Co.

**Commutator Slotters.**  
Electric Service Supplies Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.  
Wood Co., C. N.

**Commutator Slotting Files.**  
Handy Supply Co.

**Commutator Stones.**  
Handy Supply Co.

**Commutator Truing Devices.**  
General Electric Co.

**Commutators or Parts.**  
Cameron Elec'l Mfg. Co.  
Cleveland Armature Works.  
Coil Mfg. & Repair Co.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
General Electric Co.  
Mica Insulator Co.  
Westinghouse Elec. & M. Co.

**Compressors, Air.**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Westinghouse Traction Brake Co.

**Condensers.**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.

**Conduits, Underground.**  
Johns-Manville Co., H. W.  
Standard Underground Cable Co.

**Connectors, Solderless.**  
Dossert & Co.

**Controller Regulators.**  
Electric Service Supplies Co.

**Controllers or Parts.**  
Allis-Chalmers Mfg. Co.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Horne Mfg. Co.  
Johns-Manville Co., H. W.  
Westinghouse Elec. & M. Co.

**Controlling Systems.**  
General Electric Co.  
Westinghouse Elec. & M. Co.

**Converters, Rotary.**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.

**Conveying and Hoisting Machinery.**  
American Bridge Co.  
Columbia M. W. & M. I. Co.  
Green Eng'g Co.

**Cord, Bell, Trolley, Register, Etc.**  
Brill Co., The J. G.  
Electric Service Supplies Co.  
International Register Co., The.  
Roebing's Sons Co., John A.  
Samson Cordage Works.  
Trolley Supply Co.

**Cord Connectors and Couplers.**  
Electric Service Supplies Co.  
Samson Cordage Works.  
Wood Co., C. N.

**Couplers, Car.**  
Brill Co., The J. G.  
Ohio Brass Co.  
Van Dorn Coupler Co.  
Westinghouse Trac. Brake Co.

**Couplings, Conduit.**  
Horne Mfg. Co.

**Cranes. (See also Hoists.)**  
Allis-Chalmers Mfg. Co.  
Niles-Bement-Pond Co.

**Crossting. (See Wood Preservation.)**

**Cross Arms. (See Brackets.)**

**Crossing Foundations.**  
Balkwill Manganeese Crossing Co.  
International Steel Tie Co.

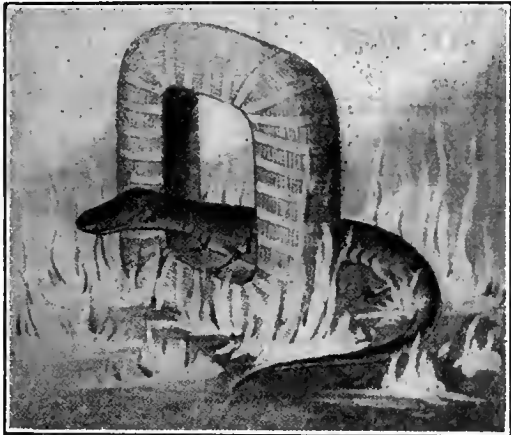
**Crossing Signals. (See Signals, Crossing.)**

**Crossings, Track. (See Track, Special Work.)**

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Allis-Chalmers Mfg. Co.

**Culverts.**  
Canton Culvert & Silo Co.

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Safety Car Devices Co.

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Hale & Kilburn Corp.

Doors, Folding Vestibule.  
National Pneumatic Co., Inc.

Draft Rigging. (See Couplers,  
Car.)

Drills, Track.  
American Steel & Wire Co.  
Electric Service Supplies Co.  
Long Co., E. C.  
Niles-Bement-Pond Co.  
Ohio Brass Co.

Dryers, Sand.  
Electric Service Supplies Co.  
Zelnicker Supply Co., W. A.

Engineers, Consulting, Contracting  
and Operating.

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Arnold Co., The.  
Beeler, John A.  
Bylesby & Co., H. M.  
Drum & Co., A. L.  
Ford, Bacon & Davis.  
Jackson, D. C. & Wm. B.  
Richey, Albert S.  
Sadderson & Porter.  
Sargent & Lundy.  
Scotfield Engineering Co.  
Sloan, Huddle, Feustel & Freeman  
Stone & Webster.  
White Companies, The J. G.  
Woodmansee & Davidson Engi-  
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Cleveland Fare Box Co.  
International Register Co., The  
National Railway Appliance Co.  
Ohmer Fare Register Co.

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American Steel & Wire Co.  
Page Steel & Wire Co.  
Standard Steel Mould Co.

Fenders and Wheel Guards.  
Brill Co., The J. G.  
Cleveland Fare Box Co.  
Consolidated Car Fender Co.  
Electric Service Supplies Co.  
Star Brass Works.  
Trolley Supply Co.  
Wood Co., Charles N.

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Johns-Manville Co., H. W.  
Westinghouse Elec. & M. Co.

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Scaife & Sons Co., Wm. B.

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Johns-Manville Co., H. W.

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Johns-Manville Co., H. W.

Floodlights.  
Crouse-Hinds Co.  
Electric Service Supplies Co.

Flooring, Composition.  
American Mason Safety T. Co.  
Johns-Manville Co., H. W.

Forgings.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
Standard Steel Works Co.

Fuses and Fuse Boxes.  
Chicago Fuse Mfg. Co.  
Columbia M. W. & M. I. Co.  
D & W Fuse Co.  
General Electric Co.  
Johns-Manville Co., H. W.  
Westinghouse Elec. & M. Co.

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Columbia M. W. & M. I. Co.  
Economy Fuse & Mfg. Co.  
General Electric Co.  
Horne Mfg. Co.

## WHAT AND WHERE TO BUY

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Power Specialty Co.  
Westinghouse Trac. Brake Co.

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General Electric Co.

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Westinghouse Elec. & M. Co.

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Brill Co., The J. G.

Gear Blanks.  
Carnegie Steel Co.  
Standard Steel Wks. Co.

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Nuttall Co., R. D.

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Westinghouse Elec. & M. Co.

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Morgan Crucible Co.

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Green Eng'g Co.

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Railway Track-work Co.

Guards, Cattle.  
American Bridge Co.

Guards, Trolley.  
Electric Service Supplies Co.  
Ohio Brass Co.

Harps, Trolley.  
Anderson M. Co., A. & J. M.  
Electric Service Supplies Co.  
More-Jones Brass & M. Co.  
Nuttall Co., R. D.  
Star Brass Works.  
Western Electric Co.

Headlights.  
Crouse-Hinds Co.  
Electric Service Supplies Co.  
General Electric Co.  
Ohio Brass Co.  
St. Louis Car Co.  
Trolley Supply Co.

Headlinings.  
Kerschper Co., Inc., W. R.  
Pantasote Co., The.

Heaters, Car, Electric.  
Consolidated Car Heating Co.  
Gold Car Heating & Lighting Co.  
Smith Heater Co., Peter.

Heaters, Car, Hot Air and Water.  
Cooper Heater Co.  
Smith Heater Co., Peter.

Heaters, Car, Stove.  
Electric Service Supplies Co.  
Smith Heater Co., Peter.

Hoists and Lifts.  
Columbia M. W. & M. I. Co.  
Duff Manufacturing Co.  
Ford Chain Block & Mfg. Co.  
Niles-Bement-Pond Co.  
Yale & Towne Mfg. Co.

Hose Bridges.  
Ohio Brass Co.

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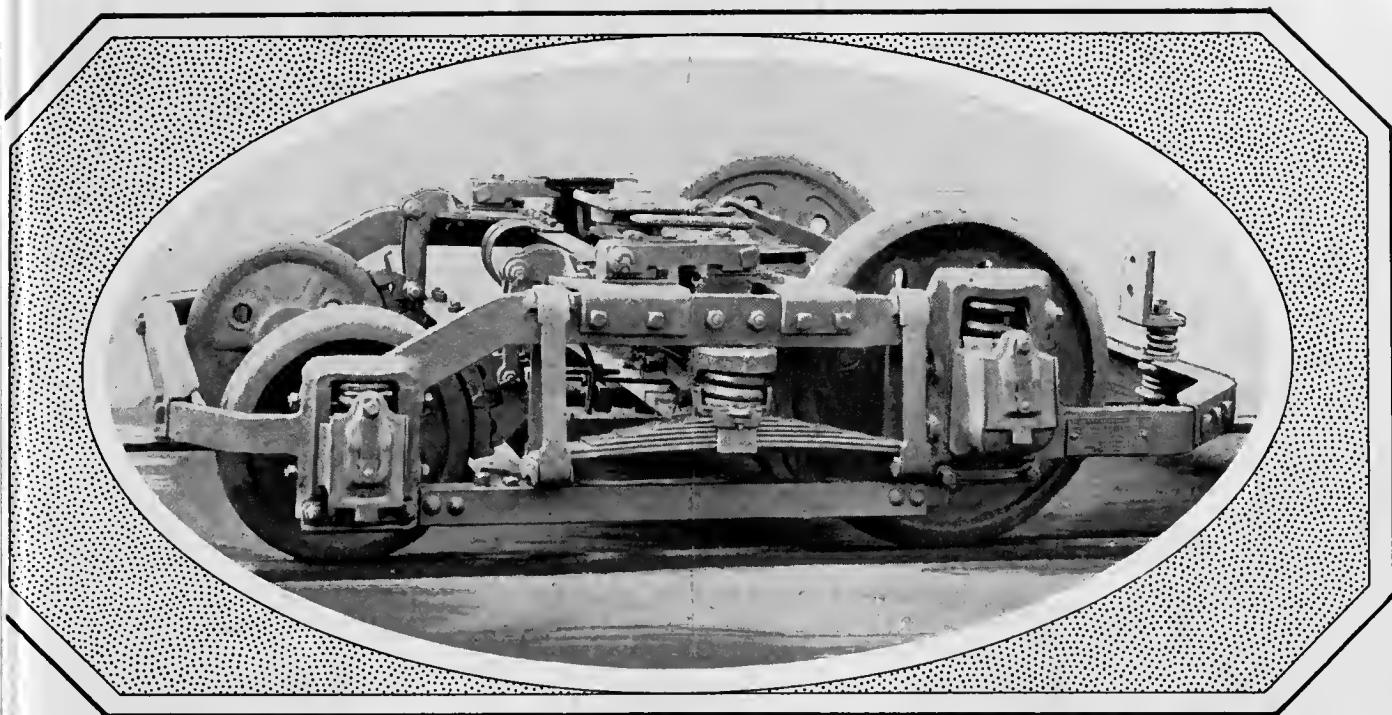
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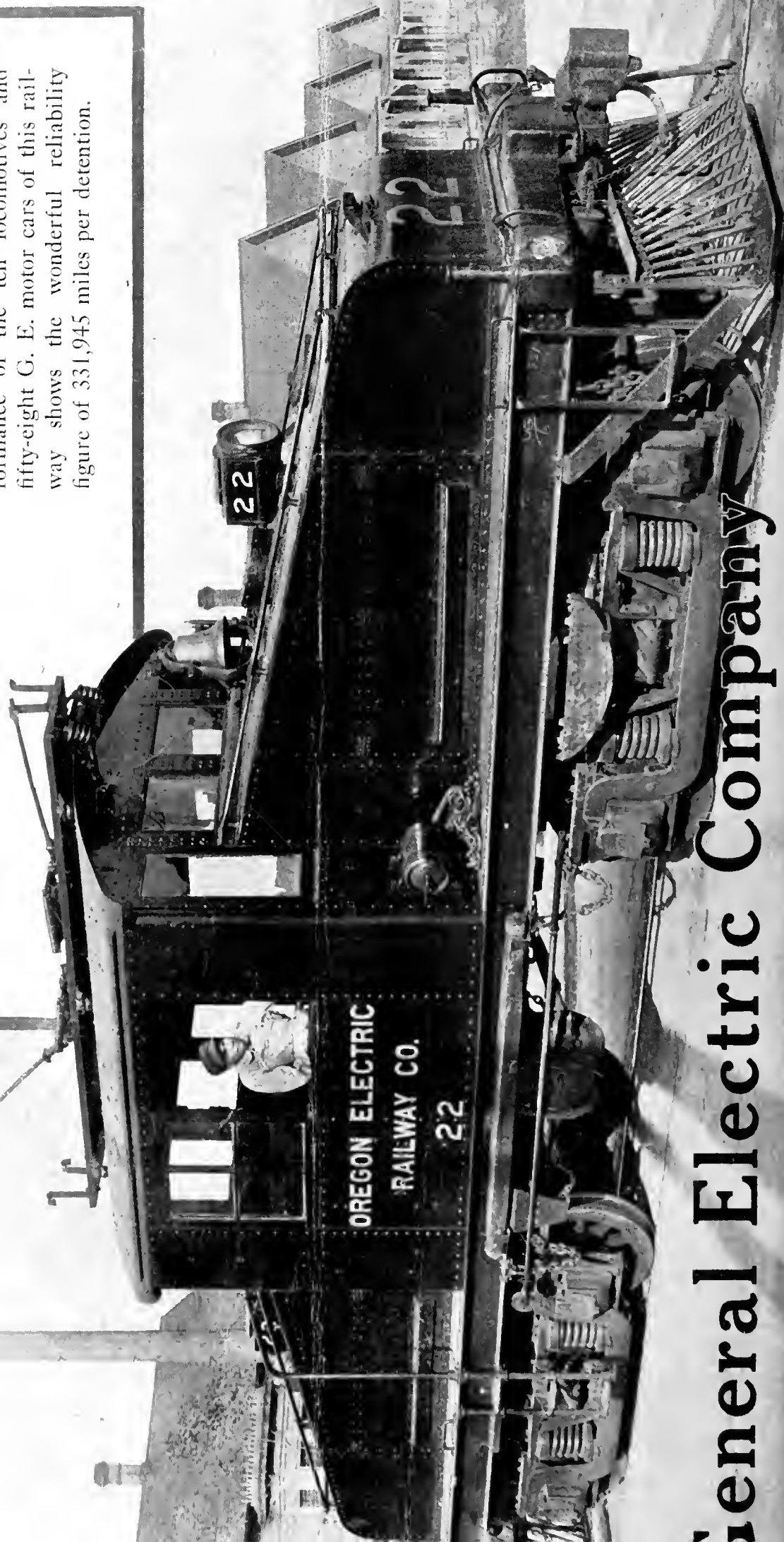
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East Pittsburgh, Pa.



# Electric Railway Journal

H. W. BLAKE, *Editor*

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# Westinghouse

## Heat-Proof Cap and Cone Suspension



Does Not Soften  
at Any Temperature

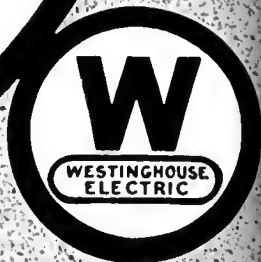
Is Stronger Than the Metal Body

It Will Reduce Your  
Line Maintenance

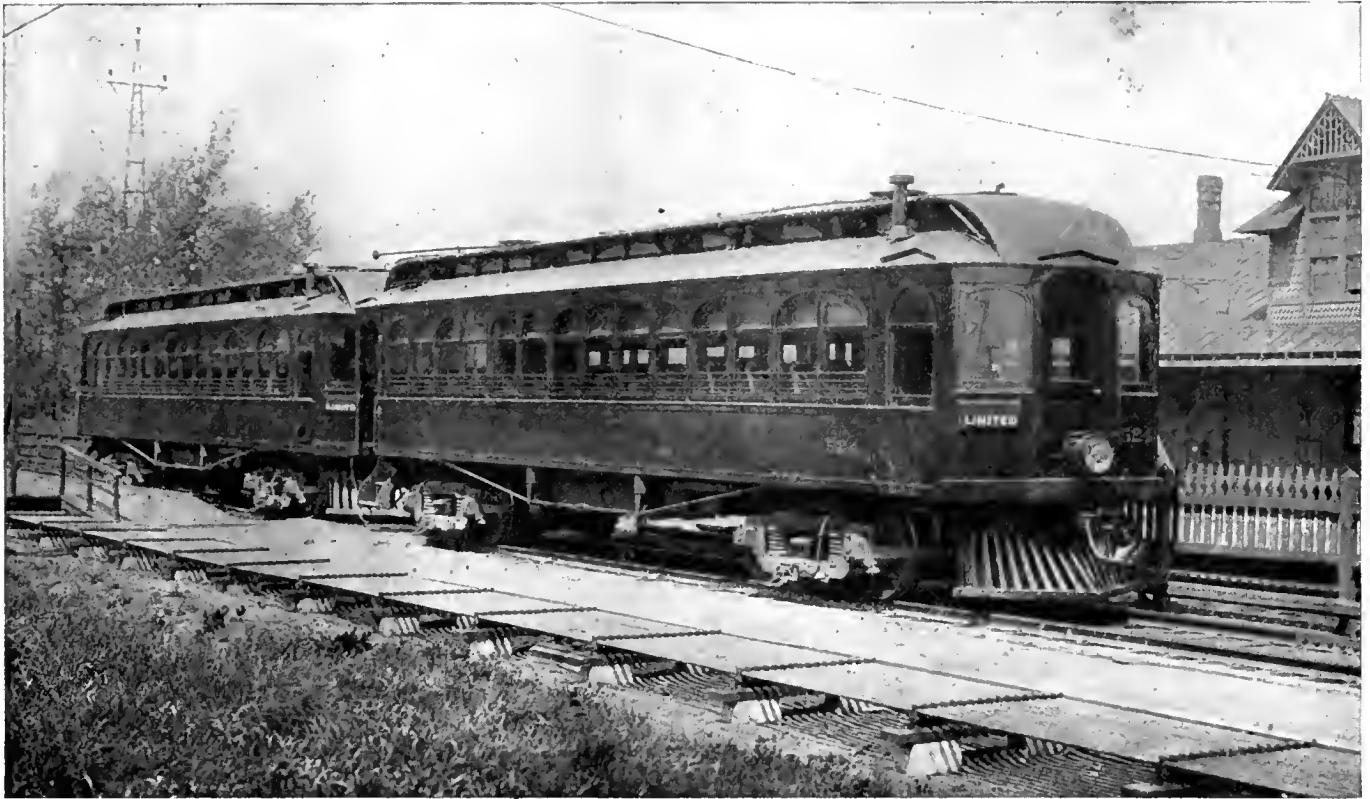
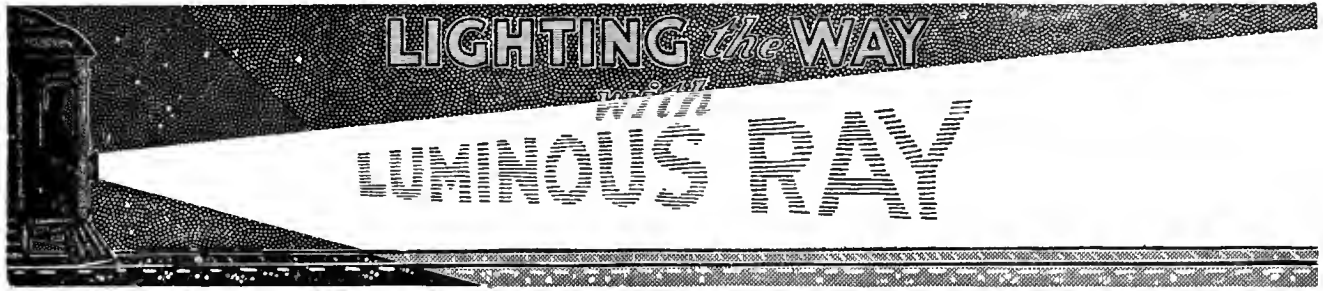
Test Voltage 10,000

Apply to our nearest office for samples

Westinghouse Electric & Manufacturing Co.  
East Pittsburgh, Pa.







## Imperial Luminous Arcs For A Safe Path Through the Night

Safety is not sacrificed for speed when Imperial Headlights are "Lighting the Way with Luminous Ray." They pierce the darkness far down the right-of-way.

The motorman can see the track clearly. And traffic on cross-roads is effectually warned of the approaching car.

Imperial Luminous Arcs are scarcely affected by voltage fluctuations. Even when the voltage is far below normal they give adequate light.

They are sturdy, trouble-proof, reliable.

*Shall we arrange a demonstration on your road?*

**The Ohio Brass Company, Mansfield, Ohio**

New York Philadelphia Pittsburgh Chicago Los Angeles San Francisco

General Sales Agents in U. S. for Crouse-Hinds Imperial Headlights



33,000 volt line on Bo-Arrow arms and Peirce Pins;  
2200 volt primary on wood arms with Peirce clamp pins;  
440 volt secondary on Peirce secondary racks.  
(Pittsburgh, Pa.)



One 33,000 volt line on Bo-Arrow arms and Peirce  
Forged Steel Pins. Two 33,000 volt lines on Steel  
Angle arms and Peirce pins. (Pittsburgh, Pa.)

## Bo-Arrow Steel Cross Arms and Peirce Pins

carry the lines of the Duquesne Light Co. of Pittsburgh, Pa., through a district where atmospheric conditions are the worst possible for line equipment.



The threads of the thimble fit loosely over the threads of the pin, and a thin cork disc is provided between the top of the pin and the thimble. Under expansion the pin simply rides up further in the thimble, the cork disc compressing. None of the strain is communicated to the insulator.

Peirce pins are guaranteed to stand strains equal to their rated strength with a deflection of less than 10 degrees, and without danger to the insulator.

Our booklet tells about "Continuity—and How" to obtain it. Send for a copy.

*The Hardware MAKES the Line—Hubbard makes THE Hardware*

# HUBBARD AND COMPANY

PITTSBURGH

Canadian Manufacturers and Distributors: Acme Stamping & Tool Works, Hamilton, Ontario

# Why INTERNATIONAL STEEL TWIN TIES Are Superior

They are designed to give the most service with the minimum amount of materials. The large tie bearing plate at the top instead of the bottom of the tie and parallel with the rail, puts all the concrete or ballast to work. The trussing of these plates gives them bending strength and forms a tamping pocket. In the case of a concrete foundation this trussing grips the set concrete and insures a full distribution of the track loads.

By offsetting the rail fastenings from the tie anchorages or the channels, the rail wave is not retarded. The clips are malleable iron castings of the tapered jaw type. They clamp the rail to the tie plate and resist shock and movement with a  $1\frac{1}{4}$  in. square section of metal.

Seven inches instead of 12 in. of concrete beneath your rail gives track a resiliency not obtainable with any other type of construction. This is largely responsible for the excellent results these ties are giving in service. And when the track structure must be removed it is much simpler to remove 7 in. of concrete than 12 in. A combination of all permanent materials makes such a requirement very remote.

These are all engineering considerations which are worth your attention. The design is right, the cost is low and the service of Steel Twin Ties is unexcelled.

*Prompt deliveries made from stock.*



Permanent Track at Less Cost  
Any Type Base — Open or Paved Track

## The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES:

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Los Angeles, Cal.

San Francisco, Cal.  
Seattle, Wash.

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Minneapolis, Minn.

# Phono-Electric

—the Trolley Wire of Long Life



Fifty-fourth St. and Lansdown Ave., Philadelphia

## Is Self-evident for Curves

THE practical impossibility of accurately maintaining curve trolley wire in the correct position relative to the wheel is acknowledged by every line engineer.

It is at curves and turnouts, therefore, that ordinary trolley wire is likely to wear out in a few months, and call for replacement under difficult conditions of installation.

Many systems which began with Phono-Electric for use on curves only, now use it extensively on straight track also. Under the most severe conditions Phono-Electric Wire will give three times the service of ordinary copper trolley wire.

**Bridgeport Brass Company**  
**Bridgeport** **Connecticut**



# KEYSTONE

## Car Specialties

Operating cars at night without efficient headlights or illuminated destination signs is not economy.

Cars equipped with "Golden Glow" Headlights and Illuminated Car Signs are attractive, safe, more efficient, and above all, are appreciated by the riding public.

Your patrons, better than anyone, realize the safety value of efficient headlights.

The bright, illuminated sign is always an inducement to ride.

"Golden Glow" Headlights and Illuminated Signs are perfect in every detail. They are a part of the broad line of well-known Keystone Specialties.

Write for catalogs.



"Golden Glow" Headlight  
Interurban Type



Illuminated Car Destination Signs

**ELECTRIC SERVICE SUPPLIES Co.**  
*Manufacturer of Railway Material and Electrical Supplies*

PHILADELPHIA  
17th and Cambria Sts.

NEW YORK  
50 Church St.

CHICAGO  
Monadnock Bldg.

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg





## Schedules Are Maintained

despite the fact that an *Erico Welder* is at work on these rails. At the approach of a car the Welder is simply lifted off the rails and the car passes by without even slackening its speed.

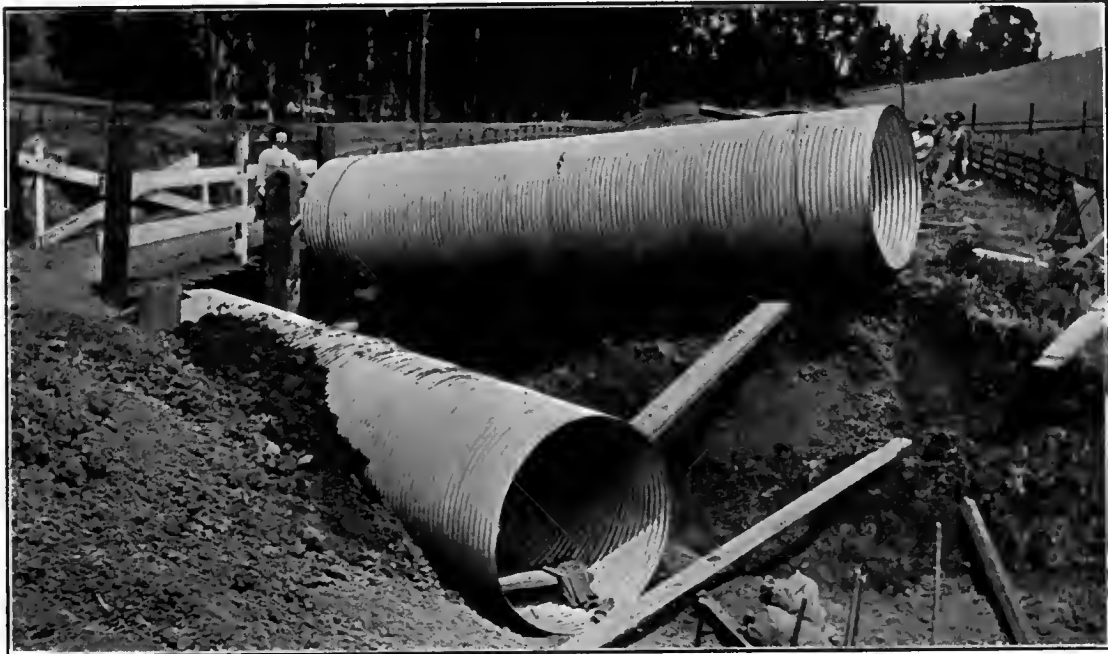
The Erico Portable Welding Outfit is gaining in value every day, as labor shortage becomes more evident.

Full information on request.

**The Electric Railway Improvement Co.**  
Cleveland, Ohio

---

*We repeat this picture  
as a comment on the Labor Situation*



## “ARMCO” IRON CULVERTS

We reiterate what we said in a recent announcement in this Journal—namely, that when you specify Culverts, you should be sure to remember that “ARMCO” Iron Culverts *cut down labor costs* in installation. Less effort is required than with any other type of construction, and less time occupied. And when installed, “ARMCO” Iron Culverts *last*—because of the purity and evenness of their material.



RESISTS RUST

The triangle brand is your guarantee that they are made from  
**THE IRON THAT'S MADE TO LAST.**

Write the nearest manufacturer for full information on  
Rust-Resisting “Armco” Iron Flumes, Culverts, Siphons,  
Sheets, Roofing, and Formed Products.

Arkansas, Little Rock  
Dixie Culvert & Metal Co.  
California, Los Angeles  
California Cor. Culvert Co.  
California, West Berkeley  
California Cor. Culvert Co.  
Colorado, Denver  
R. Hardesty Mfg. Co.  
Delaware, Clayton  
Delaware Metal Culvert Co.  
Florida, Jacksonville  
Dixie Culvert & Metal Co.  
Georgia, Atlanta  
Dixie Culvert & Metal Co.  
Illinois, Springfield  
Illinois Corrugated Metal Co.  
Indiana, Crawfordsville  
W. Q. O'Neill Co.  
Iowa, Des Moines  
Iowa Pure Iron Culvert Co.  
Iowa, Independence  
Independence Corrugated Culvert Co.

Kansas, Topeka  
The Road Supply & Metal Co.  
Kentucky, Louisville  
Kentucky Culvert Co.  
Louisiana, New Orleans  
Dixie Culvert & Metal Co.  
Maryland, Baltimore  
Wm. M. Baker, Munsey Bldg.  
Massachusetts, Palmer  
New England Metal Cul. Co.  
Michigan, Bark River  
Bark River Bridge & Cul. Co.  
Michigan, Lansing  
Michigan Bridge & Pipe Co.  
Michigan, Bay City  
U. S. Bridge & Culvert Co.  
Minnesota, Minneapolis  
Lyle Corrugated Culvert Co.  
Minnesota, Lyle  
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Missouri, Moberly  
Corrugated Culvert Co.

Montana, Missoula  
Montana Culvert & Flume Co.  
Nebraska, Wahoo  
Nebraska Culvert & Mfg. Co.  
Nevada, Reno  
Nevada Metal Mfg. Co.  
New Hampshire, Nashua  
North-East Metal Culvert Co.  
New Jersey, Flemington  
Pennsylvania Metal Cul. Co.  
New York, Auburn  
Pennsylvania Metal Cul. Co.  
North Dakota, Wahpeton  
Northwestern Sheet & Iron Wks.  
Ohio, Middleton  
American Rolling Mill Co.  
The Ohio Corrugated Culvert Co.  
Oklahoma, Shawnee  
Dixie Culvert & Metal Co.  
Oregon, Portland  
Coast Culvert & Flume Co.

Pennsylvania, Warren  
Pennsylvania Metal Cul. Co.  
South Dakota, Sioux Falls  
Sioux Falls Metal Culvert Co.  
Tennessee, Nashville  
Tennessee Metal Culvert Co.  
Texas, Dallas  
Wyatt Metal & Boiler Works.  
Texas, Houston  
Lone Star Culvert Co.  
Texas, El Paso  
Western Metal Mfg. Co.  
Utah, Woods Cross  
Utah Corrugated Culvert & Flume Co.  
Virginia, Roanoke  
Virginia Metal & Culvert Co.  
Washington, Spokane  
Spokane Culvert & Tank Co.  
Wisconsin, Eau Claire  
Bark River Bridge & Cul. Co.

Canada—Canada Ingot Iron Co., Ltd., Guelph, Sherbrooke, Winnipeg, Calgary.

# 4 Repeat Orders for THERMIT WELDS

## On the Third Avenue Railway System, New York

### Order No. 2.

#### In Old Rails

Well pleased with the record made in its new rail section, this company placed its second order for Thermit Welds to go in section LS 110-404 on the Bowery between Chatham Square and Bayard St. on old rails.

About twenty-five welds were made by our own men under severe winter weather conditions (10 degrees above zero) in the latter part of 1914.

Not a joint has broken after nearly four years of continuous service.



Bowery, Between Chatham Square and Bayard St.



Broadway, Between 45th and 59th St.

### Order No. 3.

#### On the Great White Way

Confidence based on their experience with Thermit Welds led the Third Avenue Railway System have their own men make the welds in 1915 in old rail section LS 109-340 on Broadway between 45th and 59th Streets.

About 100 welds were made on 5-ft. "dutchmen" installed to span the severe breakages which had occurred in cast-welded joints.

Only two breaks are reported under the extreme service imposed on this busy section.

Thermit Welds insure perfectly smooth joints that will not dish under the heaviest traffic.

The continuous track produced retains its maximum conductivity throughout, minimizes electrolysis and retains a higher and more economical operating voltage.

They are easily installed in your rails. A sound investment for any electric railway—large or small. Write.



### METAL & THERMIT CORPORATION

Successors to Goldschmidt Detinning Co. and the Goldschmidt Thermit Co.  
120 BROADWAY, NEW YORK

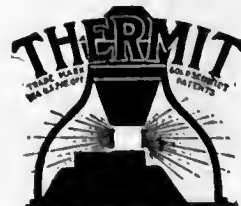
329-333 Folsom St., San Francisco

7300 So. Chicago Ave., Chicago

Factories located at Chrome, N. Y.; Wyandotte, Mich.; East Chicago, Ind.; Jersey City, N. J.

103 Richmond St., W., Toronto, Ont.

1427-1429 Western Ave., Pittsburgh, Pa.



# The Atlas "A" Method of Contract Chemical Weed Killing



View of Larger Type of Atlas Sprinkling Equipment in Operation Under Contract. In all contracts we furnish some one of our types of equipment most suitable to the character of the work.

Have you kept abreast of progress in track weeding or are you still using the slow, laborious method of hand weeding with the present scarcity and expense of track labor?

Do you realize that hand weeding has been largely supplanted by a modern, efficient, chemical method, which accomplishes in a day what a track gang takes a month to do?

It does the season's work in one operation, and so sterilizes the soil that the following year's costs are materially reduced, although the initial expense is less than that of hand weeding.

The approach of weed weather, the unusual scarcity and exceptional cost of labor, the delays in freight transportation and the shortage of raw materials all urge your early consideration of the weed removal problem.

A detailed estimate of cost for treatment of your track by the Atlas "A" Method will gladly be made for you upon request.



Before

**Chipman Chemical  
Engineering Co., Inc.**

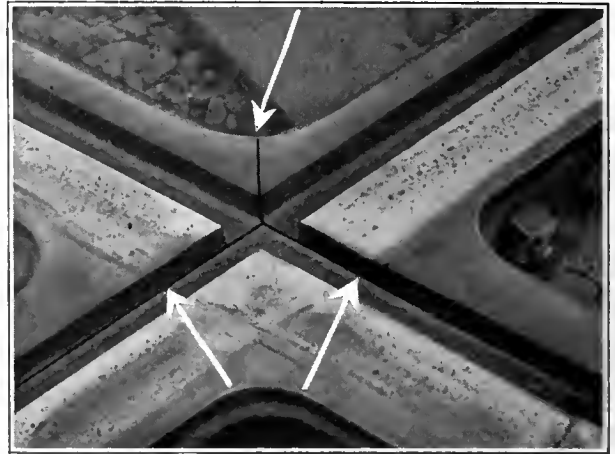
95 Liberty Street  
New York



After



What Happens to a Rolled Rail Crossing



Joints in Balkwill Articulated Cast Manganese Crossings are life savers. They positively prevent breakage at flangeway intersections, permitting 100% wear before renewal

## Why Balkwill Articulated Cast Manganese Crossings Are Superior to Rolled Rail Crossings

This picture at the left shows where breaks in the main steel flangeway or backbone of rolled rail crossings are usually found.

These breaks are unavoidable because of the lack of flexibility of the rolled steel filler at the flangeway intersection.

In the Balkwill Articulated Cast-Manganese Crossing the difficulty is

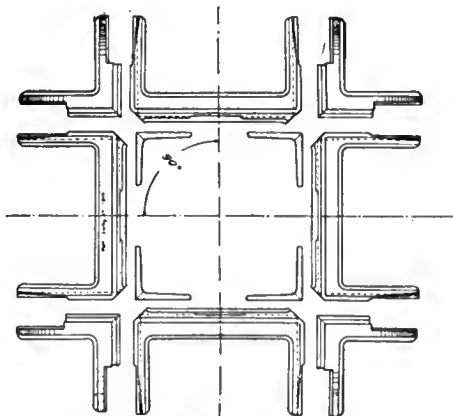
corrected by placing scientifically designed joints at the very places where breakage formerly occurred.

The lower first cost of a rolled rail crossing is therefore not a lower overall cost because it takes several rolled rail crossings to equal the life of one Balkwill Articulated Cast Manganese Crossing. Therefore the Balkwill Crossing is the cheapest in the long run. It gives

### MORE WEAR PER DOLLAR THAN ANY OTHER CROSSING YOU CAN BUY

It saves interruptions to traffic, makes less demand on labor, which is now so scarce, and also reduces the cost of making replacements frequently.

Write us for data on existing installations. If your special work manufacturer cannot get prompt deliveries of manganese castings or has not taken out a license to manufacture these crossings, **DON'T ACCEPT A SUBSTITUTE** but write us direct and we will see that your requirements are taken care of.



Joints at the flangeway intersections of Balkwill Articulated Cast Manganese Crossings positively eliminate breakage

**Order Balkwill Articulated Cast Manganese Crossings  
Direct from Your Special Work Manufacturers**

# **The Balkwill Manganese Crossing Co.**

506 Williamson Building, Cleveland, Ohio



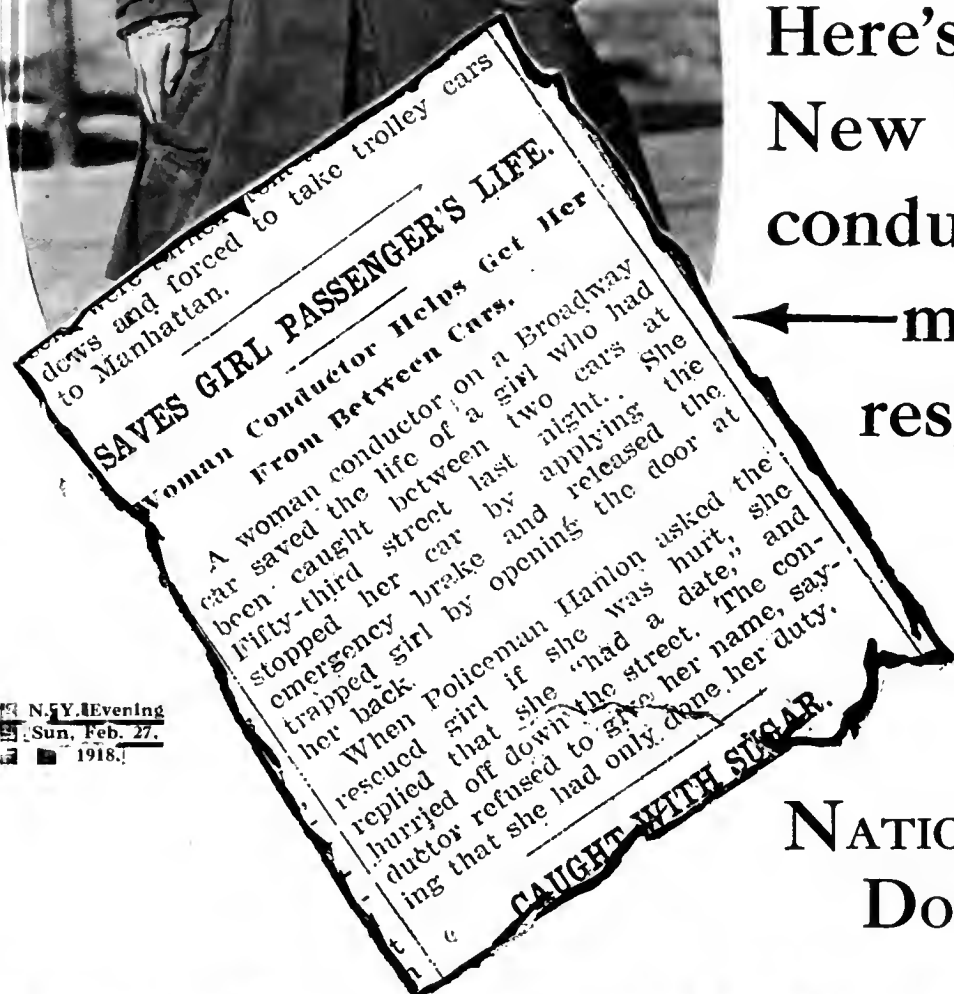


# Saved a LIFE

—“only  
did her duty.”

Here's the way  
New York women  
conductors are

← meeting their  
responsibilities



This car, like all  
other Broadway's  
Stepless Cars, is  
equipped with

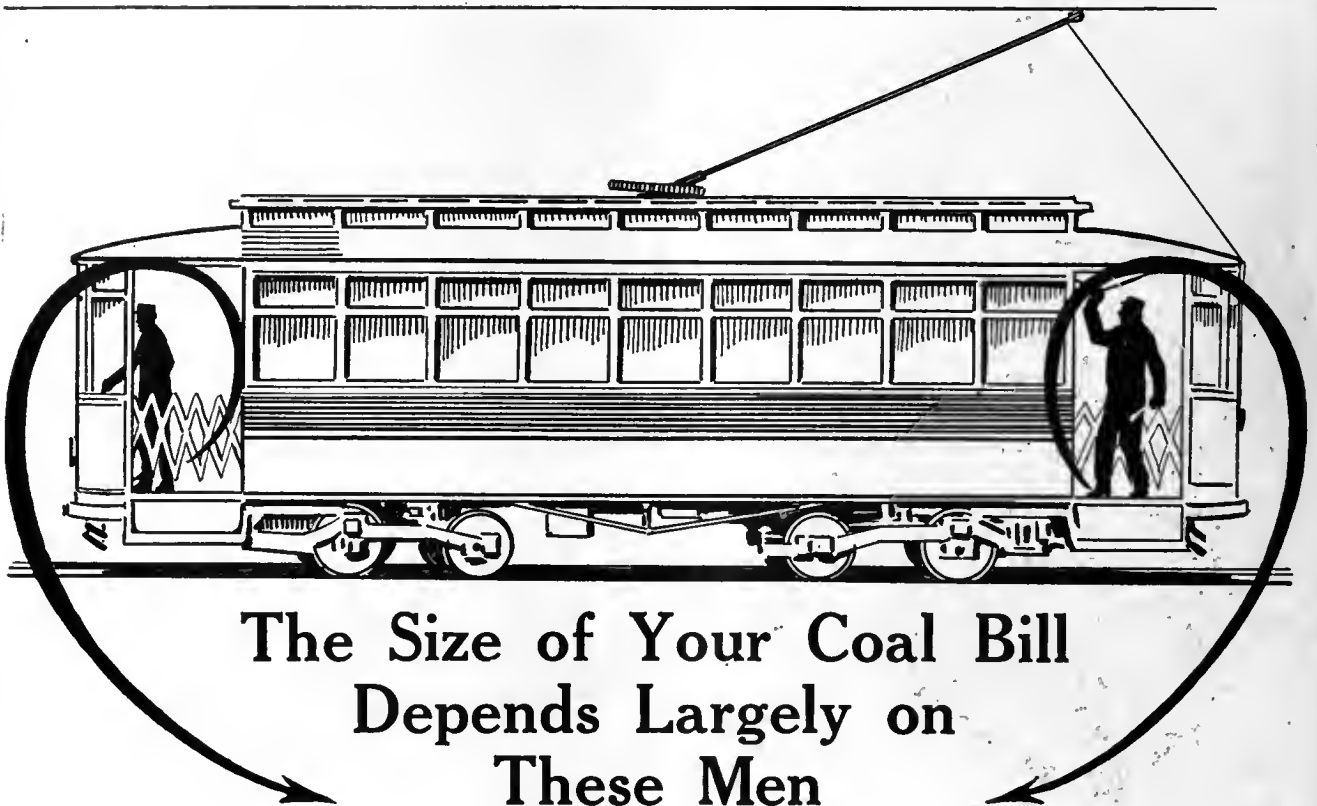
NATIONAL PNEUMATIC  
DOOR CONTROL

**NATIONAL PNEUMATIC COMPANY**  
INC.

50 Church St. New York



515 Laflin St. Chicago



## The Size of Your Coal Bill Depends Largely on These Men

Cutting out waste of power by improving boiler-room and power-plant methods and equipment is fine—and saves money.

Cutting out waste of power by skillful designing of cars to eliminate excess weight is also essential—and saves money.

But you are never going to reduce your power cost to the minimum for a given service until you cut out the waste at the point of use—on the car.

When your motormen continuously operate cars over a given run on a given schedule with the least possible amount of power necessary to maintain that schedule then—and not until then—will you have eliminated the chief waste of power.

And the motorman cannot get the *best* results without the cooperation of his conductor. And you cannot successfully train and educate car crews to the use of minimum power without an automatic and reliable means of recording individual and crew efficiency.

## The Arthur Power-Saving Recorder

provides that means.

It is simple—inexpensive—reliable—easy and economical to install and maintain.

It shows exactly how many minutes power is on during a run or day and whether the brakes are used roughly and to excess. It therefore provides an exact basis for determining the relative efficiency of car crews.

It requires no use of live wires—no switches—no resistances—no shunts.

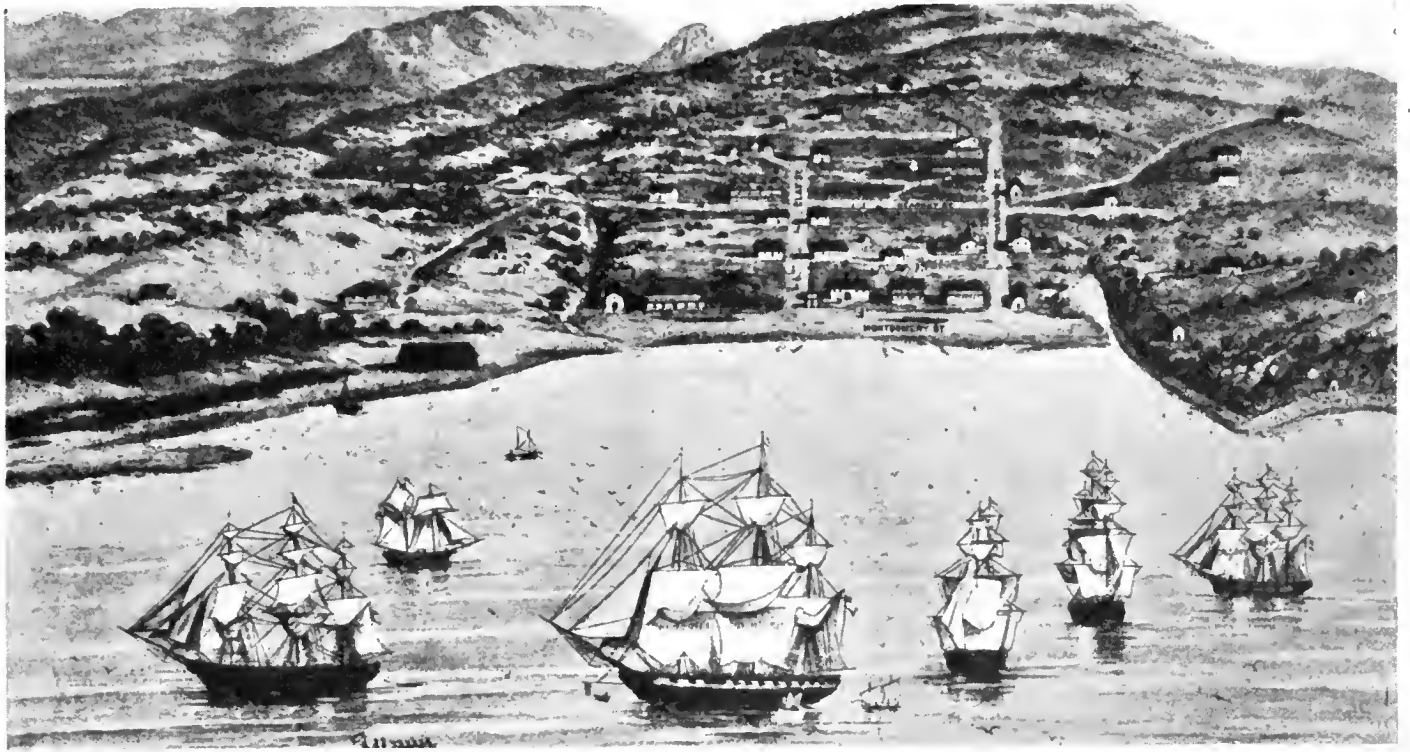
It conserves power and car equipment. Checks waste. Insures safe, careful car operation.

It has *proven* its value.

**The Arthur Power-Saving Recorder Co.**

Second National Bank Building, New Haven, Conn.

***"Power wasted is the true measure of the motormen's relative efficiency"***



In 1846, when this picture was made, San Francisco was a small port, called Yerba Buena, at which sailing ships called now and then. The United States flag was raised over the Presidio in that year.

## When the Gold Rush Began

few Easterners knew that such a place as San Francisco existed, but when the first news of the discoveries of gold in Sonora County (January, 1848) reached the coast, the name of the city spread like wildfire East, North and South.

Then the inrush from every nook and corner of the earth began and the population jumped in a most marvelous manner: January, 1848, 600; February, 2000; August, 6000; December 20,000; July, 1849, 100,000.

Transportation demands were extraordinary in those years. Everything that could pull a load was impressed into service, including dogs and goats; once the potential city got really under way horse cars were started near the water front, and, later on, cable cars were tested there under practical conditions for the first time in the United States. Now a splendid system of interurban lines connects the great Western metropolis with the nine flourishing towns within an hour's ride, which are usually considered "suburbs" of "Frisco."

## Galena Oils

and Galena Service went West early and have done their full share in solving difficulties and aiding progress in the transportation needs of the "Golden West."

**Galena-Signal Oil Co.**  
Franklin, Pa.



The Plant Behind the Product—A view of the forge and heat treating departments of the Valley Works at East St. Louis, Ill.—the home of "Electroheat" Axles.

# "Electroheat" AXLES

—a Product of "Laboratory Accuracy"

Scientific certainty attends the manufacture of "Electroheat Axles."

From the making of the steel in the open-hearth furnace to the various steps of forging and machining "Electroheat" Axles pass through skillfully trained hands—every operation is performed by men who know. But it is the vital final operation of *heat treatment* that stands out as a new achievement in axle making. Here almost *laboratory accuracy* is attained!

By "laboratory accuracy" in heat treatment is meant the wonderful precision exercised in heating these axles for annealing, quenching or tempering; for herein lies the only means of obtaining absolute *uniformity* in manufacture and the *exact* physical properties essential to maximum safety and service.

The heating of "Electroheat" Axles by electric furnace makes possible this "laboratory accuracy" in manufacture. And when Laclede engineers applied the "Electric Way" to axle manufacturing they developed a process that insures not only *better* axles—but better axles in quantity by reason of the *uniformity* which it makes possible.

**Safety, Service, Satisfaction — that's what you buy in "Electroheat" Axles. Use is the test!**

Note: "Electroheat" Armature shafts possess the same torsional and shock-resisting qualities as "Electroheat" Axles, being heat treated by the same process. They minimize service breakdowns and maintenance costs.



"If Heat-Treated Electrically—It's a VALSCO"

## LACLEDE STEEL COMPANY

General Offices—Federal Reserve Bank Building  
SAINT LOUIS, MO., U. S. A.





To Save the Lives of Our  
Brothers and Sons

Invest in U. S.

## Liberty Bonds

The supremely important business of America now is to win this war. This eight page message on that subject is made possible by the patriotic co-operation and support of the following firms:

Columbia Machine Works and Malleable Iron Co..	26
Consolidated Car Fender Co.	20
Drew Electric & Mfg. Co..	21
Hale & Kilburn Corp.....	24
Ingersoll-Rand Co.....	24
Mc-Graw-Hill Co.....	19
More-Jones Brass & Metal Co. ....	23
Westinghouse Traction Brake Co. ....	25
Wharton, Jr. & Co., Wm..	22



# We Shall Prove Worthy Of Our Heritage

*This is a good time to consider the history of our country. It is three thousand miles from one American coast to another, and every mile was fought for.*

Our forefathers fought for the privilege of mere existence. They fought the terrors and hardships of an unknown and forbidding land; they fought cold, hunger, wild beasts and blood-thirsty savages; they fought their mother country and all others which sought to curtail or threaten their liberties, and when it was proposed to sever the ties which bound together

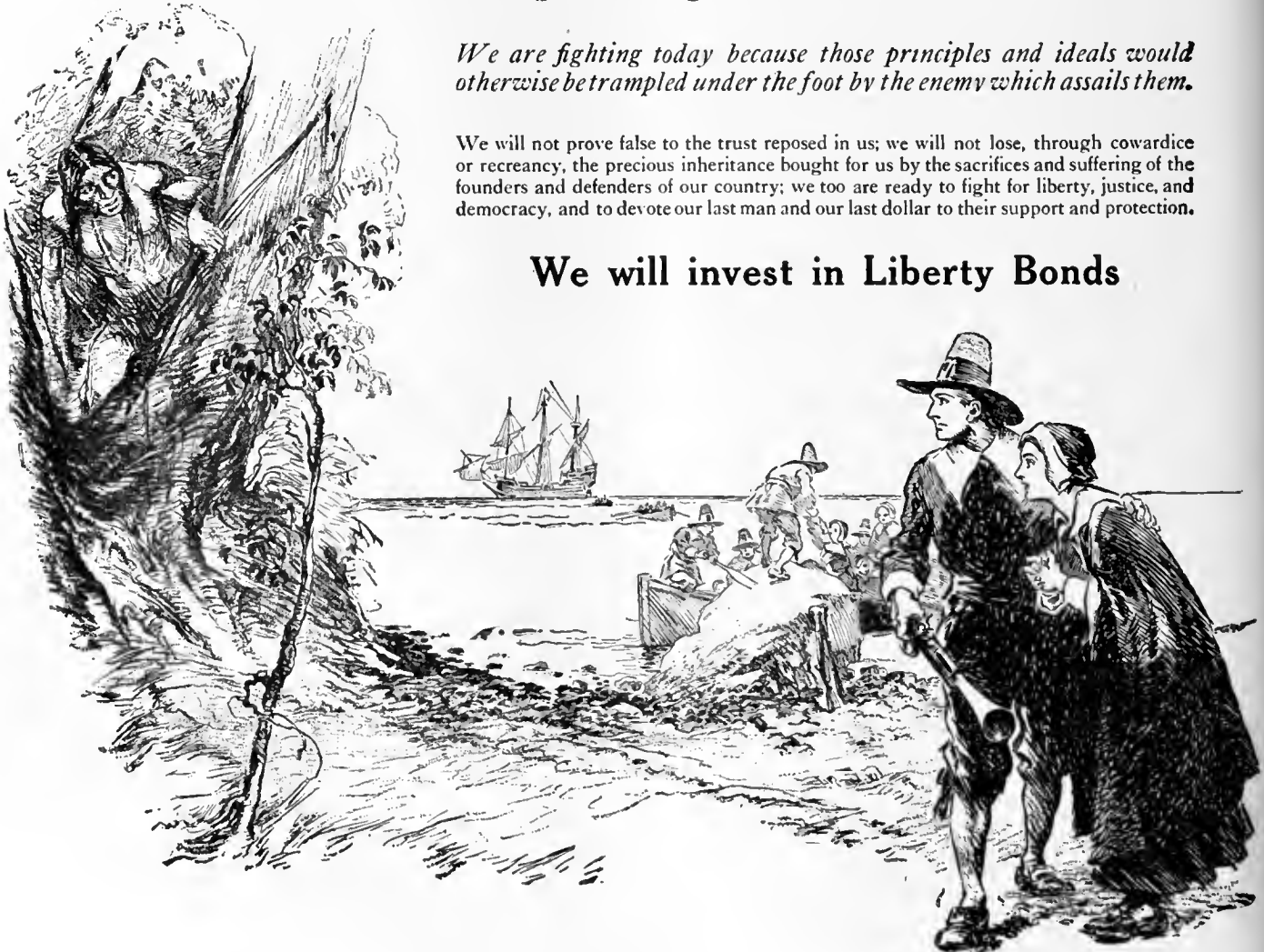
the federation of states, which they had formed, they fought that issue to a finish in the greatest war the world had seen.

We owe our country to the fact that we descended from a race of fighters. The red stripes in our flag symbolize the blood so freely shed for the principles and ideals of which that flag is the standard.

*We are fighting today because those principles and ideals would otherwise be trampled under the foot by the enemy which assails them.*

We will not prove false to the trust reposed in us; we will not lose, through cowardice or recreancy, the precious inheritance bought for us by the sacrifices and suffering of the founders and defenders of our country; we too are ready to fight for liberty, justice, and democracy, and to devote our last man and our last dollar to their support and protection.

## We will invest in Liberty Bonds



In co-operation with the Liberty Loan Committee this advertisement is published by

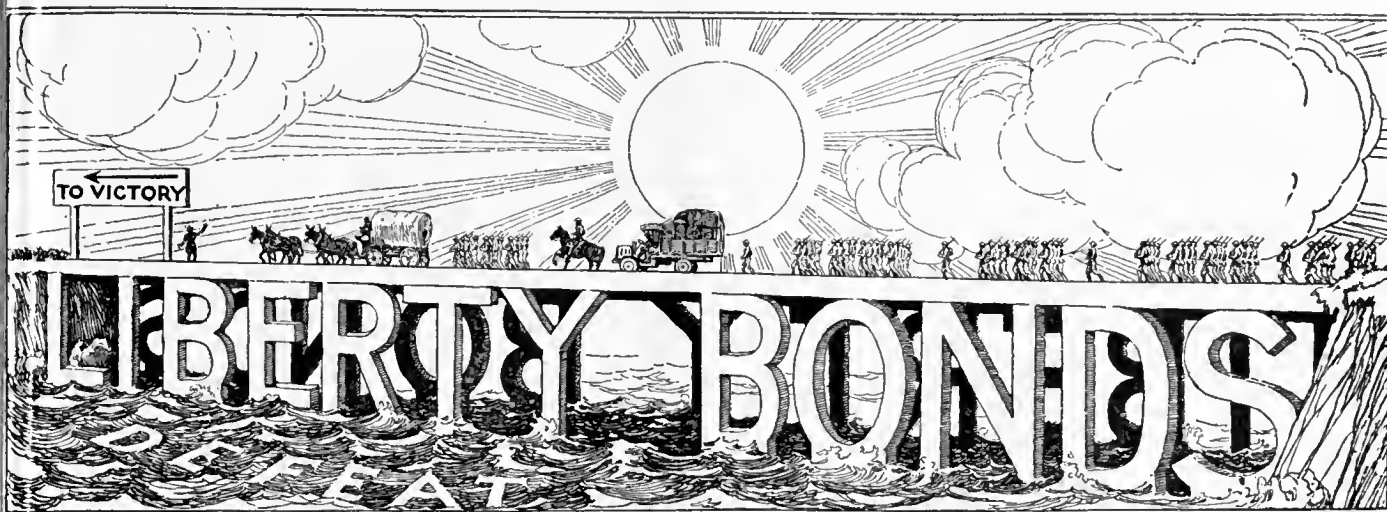
**The Consolidated Car Fender Co.**

Providence, R. I.

General Sales Agent

**Wendell & MacDuffie Co.**

61 Broadway, N. Y.



## The One Sure Road To VICTORY

**T**HERE is but one sure road to VICTORY—  
the defeat of the German armies in the field.

There is but one sure road to VICTORY, and it must be built upon the toil, the steady purpose, the *saving* and the *lending* of a whole nation.

There is but one sure road to VICTORY, and it must be built upon the Liberty Bonds of a loyal and united American people. On this road, and this road alone, can our splendid armies drive through to the Rhine—and beyond! *Build well, O Road Builders, and build quickly!*

*BUY LIBERTY BONDS*

**BUY! BUY! BUY 'TILL IT HURTS!**



In co-operation with the Liberty Loan Committee this advertisement is published by

**Drew Electric & Mfg. Co.**  
Indianapolis, Ind.



## Our War and We Must Win It

*In a recent address in Chicago, a prominent American business man said:*

"Our war vessels have been destroyed, our soldiers and sailors killed and captured, and our casualty lists are being published, yet in the face of this we go on from day to day, living in an atmosphere of smug peace, making the war effort that comes to us, that is forced upon us, even as if we refused to realize that *this is our war and we alone must win it.*"



Now is the time, before some fearful disaster overtakes us, to shake off this dangerous lethargy, to rouse ourselves from this false dream of peace and safety, to awake to a

full realization of the gigantic task we have undertaken, and the dread menace under which we rest. The "effort which is forced upon us" is not enough.

There must be universal, spontaneous, unstinted and unlimited effort if we are to win this war. There must be an overwhelming investment in Liberty bonds.

### This is our war—Let's go in and win it!



The Kaiser calls us "a nation of dollar chasers." Let us show him that we know how to use those dollars in the defense of Liberty and the overthrow of Prussianism.

**Wm. Wharton, Jr. & Co., Incorp.,**  
Easton, Penna.

# BOND

## VICTORY'S FOUNDATION.

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In co-operation with the Liberty Loan Committee this advertisement is published by

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*What about the boys who are fighting for you in France?*

For them, the trenches; the pitiless storms of rain and sleet; the ceaseless deafening bombardment of the guns; hunger, cold, and fever; wounds and death. For you,—a little economy and deprivation.

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*What are  
you doing—  
are you  
doing your full  
share for them*

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“H<sup>E</sup>S got a bagful of the best securities on earth—and he stands behind them. He’s putting these fighting bonds into the homes of our folks from Maine to California. Why, man, this is the chance of a lifetime—to help this grand old country, and to lay something by for that little house on the hill you have been dreaming about.

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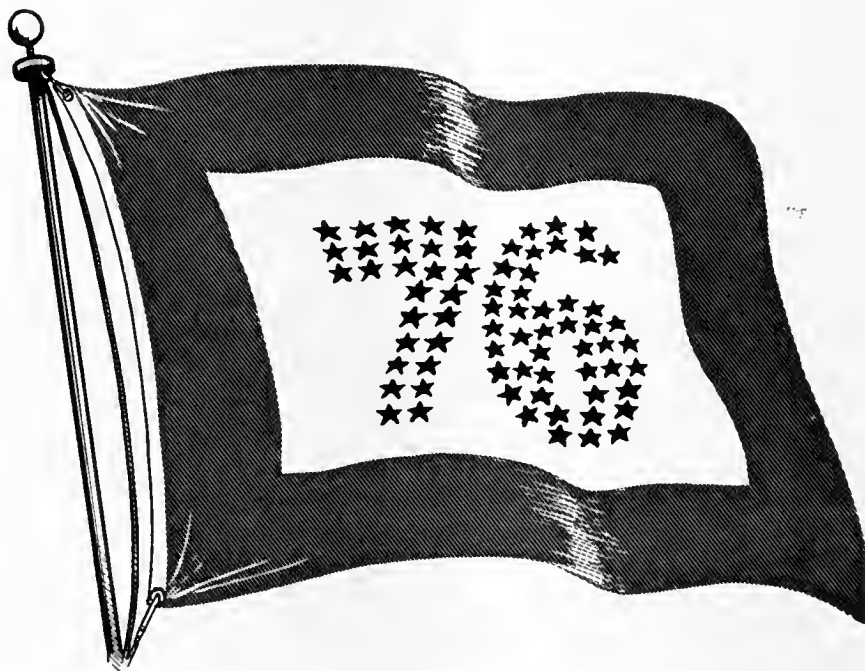


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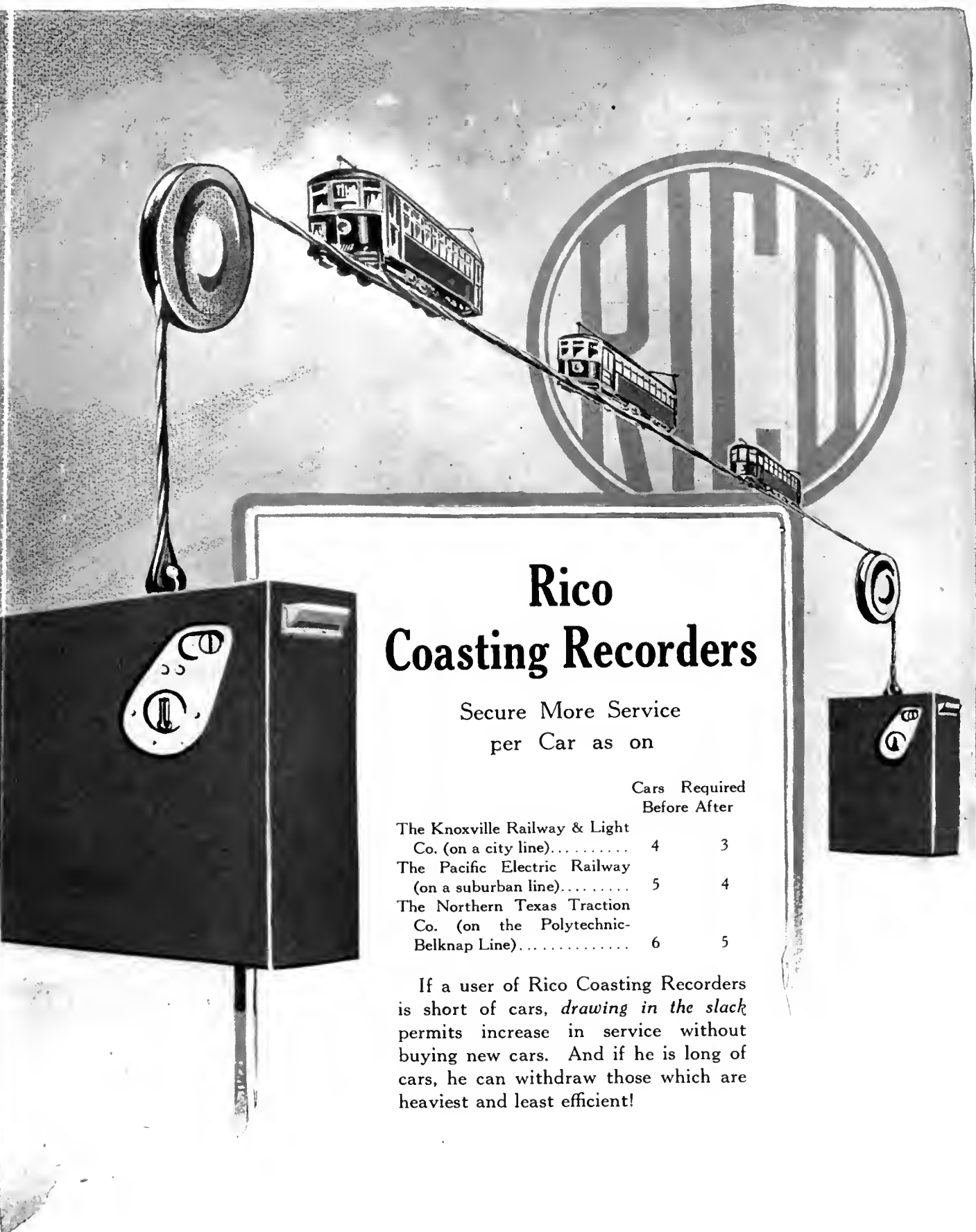


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Secure More Service  
per Car as on

	Cars Required	
	Before	After
The Knoxville Railway & Light Co. (on a city line).....	4	3
The Pacific Electric Railway (on a suburban line).....	5	4
The Northern Texas Traction Co. (on the Polytechnic-Belknap Line).....	6	5

If a user of Rico Coasting Recorders is short of cars, *drawing in the slack* permits increase in service without buying new cars. And if he is long of cars, he can withdraw those which are heaviest and least efficient!

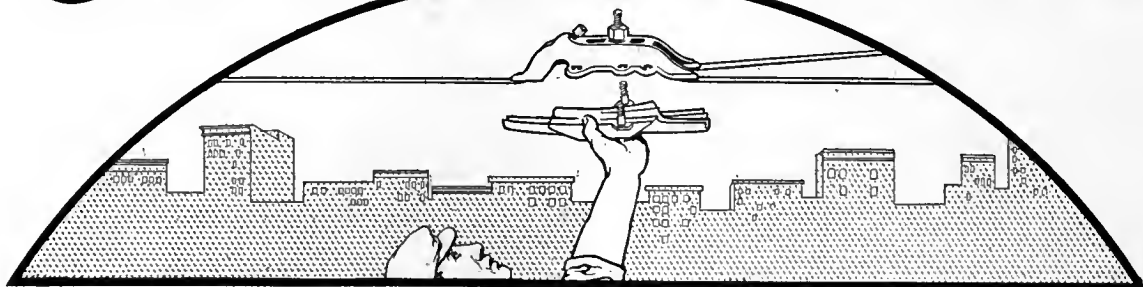
# Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO.



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# "Just bolt it on"



Type N Frog (15°)

Cat. No. 200291—left hand  
Cat. No. 200293—right hand  
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The wear is on one part only—  
A Renewable Pan which can be  
replaced at one-half the original  
cost of frog.

No pull-up tackle is necessary  
in making replacements.

The complete change-over  
can be made in two minutes,  
causing minimum interference  
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\*Southwest General Electric Company. For Canadian Business refer to Canadian General Electric Company, Ltd., Toronto, Ont.  
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# Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 51

New York, Saturday, April 13, 1918

Number 15

## Union Leaders Should Prevent Sympathetic Strikes

**T**HIS is no time for radical action on the part of either capital or labor. We believe that both employers and employees are in general endeavoring to avoid conflict. Here and there, however, trouble arises, and then one of the most important questions is—what attitude should fellow employers or labor men take?

Recently in Kansas City, as a result of a general sympathetic strike order following a disagreement between a number of laundry drivers and their employers, the union employees of the Kansas City Railways took a strike vote, which was unanimously opposed to suspension of service. After the strike was called, however, the men were ordered out by "business agents" and the local president under threat of physical interference. The men obeyed in spite of their August, 1917, agreement with the company to arbitrate all grievances. Eventually the sympathetic strike fizzled out, but the occurrence demands warning to union leaders.

Electric railways are public servants; they must perform their duty at all times. When public thought has advanced so far that serious consideration has been given to the problem of preventing strikes among railway employees, union leaders ought to realize that the public will not tolerate any interruption of service because of disputes in other fields. Furthermore, the breaking of arbitration agreements will only do great injury to the contractual reliability of union bodies.

Labor leaders, therefore, should keep a firm hand on disorders of this sort. Merely to urge employees to keep their agreements is not enough. If local bodies refuse to follow the arbitration policy proclaimed by the Amalgamated Association, their charters should be cancelled. The association should punish swiftly and surely all breaches of faith.

## High Time for the Automatic Substation

**W**HEN Milton wrote "He also serves who only stands and waits," he must have foreseen the railway substation attendant. "Attendant" he is rightly named, for standing and waiting is his main job. Since Satan always finds some mischief for idle hands to do, those substation attendants who do not improve each shining hour in the study of electricity, Harold Bell Wright or the uplift of the potato have ample time to brood over their lot in life. They have little more to do than manipulate switches in accordance with the vacillations of the voltmeter. To be sure, this is important work, but it hardly calls for heavy remuneration. At best the cost of substation attendance is an ap-

preciable item, even on city roads; but in these times the burden is heavier than many a railway can bear. Regardless of that fact, substation operators have not hesitated to demand wages in proportion to the increased cost of living or even in inverse proportion to the scarcity of electrical workers. When the railways have been unable to comply, the substation men have gone on strike and greatly embarrassed the service.

However, it is axiomatic that every evil finds a cure. Happily this is already true of the substation. Several years ago automatically operated equipment for railway substations was introduced with much diffidence. To-day, it has become a matter of course. The pioneers, particularly, have reason to congratulate themselves on their foresight, for they are saving copper as well as labor. When we consider the necessarily diffusive character of railway management, it is a matter of wonder that this particular kind of dependence upon human fallibility was not abolished long ago. No other public utility is so handicapped by the excess of wage over material costs; yet the electric railway has lagged lamentably behind its possibilities in the development and use of substitutes for human labor.

## The Time Has Come to Resume Committee Activities

**T**HERE has been a great deal of favorable comment upon the action of the American Electric Railway Association in deciding to hold a convention this year even though the exhibits be omitted. The recent annual meeting of the Central Electric Railway Association demonstrated the value of the active continuation of association work, even to the extent of holding conventions. The still more recent annual meeting of the American Railway Engineering Association is another case in point. The latter association did not curtail its committee activities. As a result, progress has been continued and some valuable reports were presented.

The committee work of the American Electric Railway Association and its allied associations has been held in abeyance for a year as the result of the unsettled conditions caused by the entry of the country into the war. There was some adverse comment at the time it was decided to postpone all committee work. This thought was based on the sincere belief of many that there is no time like the present for active committees to accomplish great results, particularly along maintenance engineering and operating lines. The concerted action of committees should be directed toward the collection of data and the dissemination of information for the solution of the many new problems in economical maintenance created by war conditions.



We are inclined to the belief that the Engineering Association could accomplish a great work for the industry if its important technical committees were instructed to disregard assigned subjects to whatever extent might be necessary and devote their time to the study and preparation of reports dealing with such subjects as power station operation in war time, maintenance of equipment under war conditions, war-time track maintenance methods, etc.

### Complaints of Poor Service Have Very Great Potential Value

THE newspaper offices in many cities, during the past winter months, have been flooded with complaints of the poor service being furnished by the electric railways of the country. This has been due, first, to the terrific operating conditions which have obtained and, second, to the unexpected demands which have been caused by the expansion of war activities. Many of the complaints are unjust but not a few have a legitimate basis. But whether the complaints are just or unjust, electric railway managers should study these criticisms because they can be utilized.

Let us consider first the complaints which are based on misapprehension. Every reasonable complaint of this kind gives an opportunity for explanation. The public knows, as a matter of personal experience, how severe the past winter has been. It would seem that if in some way this personal experience could be connected up with the difficulty of operating an electric railway a telling argument could be advanced. Not only were operating conditions severe but it was impossible to secure labor and material for proper maintenance. People generally ought to appreciate this fact also if it is suitably emphasized in publicity campaigns, because it has a counterpart in their own domestic arrangements. In this connection it does no harm to acknowledge that railway service is not perfect, and probably would not be even if conditions were much more favorable. However, the management can explain that it is trying to give good service and must be judged by intention as well as performance. Again, the public believes many things about electric railway operation which are not true. These beliefs become apparent only through complaints, and in answering these an excellent chance is given to dispel popular illusions.

But, after all, the greatest value of complaints is in pointing out the real weakness in the service. Ultimately it is the patron who must be the judge of quality of service, which cannot be tested by arbitrary standards set up by the interested parties, the electric railway managers. After all possible and permissible explanations have been made, the fact still remains that people will ride either because they want to or because they must, or both. The more people that we can get to ride because they want to, the more substantial will be the transportation business.

In the past it has often been necessary to invite complaints in order to draw out the public point of view. This has not been necessary on most roads during the past few months. Now that the weather is better complaints are less numerous and there is an opportunity to digest them along the lines suggested.

### Getting Together on the Lightning Arrester Problem

THE changing seasonal conditions in this country give variety, if not relief, to the troubles of the master mechanic and superintendent of power. The snow and sleet of winter are never safely past before the lightning troubles of spring and summer arrive. Surely if there is any place in the maintenance of the equipment of a railway where "a stitch in time saves nine" it is in connection with the lightning protection problem. Of course, no arrester yet built can take care of a direct stroke-to-line case of trouble. It is singularly fortunate from a protection standpoint, however, that such strokes constitute only a small percentage of the so-called lightning troubles. At the present stage of the art good protection from the majority of such troubles can be secured at a very reasonable cost.

But to secure good protection much co-operative work is necessary. The equipment must be suited to the service; it must be properly installed, and last, but most emphatically not least, it must be carefully maintained. Good arresters will fail when improperly applied or installed, and run-down-at-the-heel protective equipment is bound to give protection of a similar character. In application, in installation and in maintenance methods the wide experience of protective equipment manufacturers should be of much value to the railway operating officials, and the best results will be secured only when the experience of the manufacturer is correlated with the work of the operator. Above all things the operator must not forget about the maintenance part of the work. It is always important that protective equipment receive a general overhauling before the advent of the heavy thunderstorm season, and this year the scarcity of shop labor considerably augments the importance of such overhauling and of continued care in arrester maintenance.

Inasmuch as good protection in the overhead systems lessens the hazards to car propulsion equipment and good car protection lessens lightning troubles in the substation, it is immediately apparent that there must also be active co-operation between the shop and power departments. Each department must do its share. Carelessness on the part of one endangers the equipment and reduces the efficiency of the work of the other. With a given amount of protective equipment best results will always be secured when this equipment is installed and maintained according to a plan, and this plan should be based on the correlated action of the two departments concerned.

That the results of carefully worked out and executed protection plans are worth while a number of articles printed in the *ELECTRIC RAILWAY JOURNAL* within the last few years bear witness. Some of these reports have shown that fully 90 per cent of the motor and other apparatus troubles due to lightning can be averted by proper protection. On many railroads the saving resulting from such trouble elimination would more than pay the annual charges on the protecting system in normal times. Under the present conditions of high repair material costs and a very limited labor supply a well-planned scheme of protective equipment installation and maintenance should return worth-while results.

## Justice to Railways Is Removed Another Step

IN THE twinkling of an eye New York has been turned back to the Stone Age of regulation. Instead of influential bodies, exercising in a broad-minded way the delegated paramount rate-making power of the State and dispensing even-handed justice to electric railways as well as the public, the First and Second District Commissions have become worthless boards, powerless to control local railways except with the permission of the municipalities.

This is not an overdrawn picture. The change described may be the necessary outcome of the decision of the Court of Appeals in the Rochester fare case, mentioned on another page. That such a result is certain will undoubtedly be denied by the Public Service Commission for the First District, whose reasoning the court followed. Nevertheless, we have only to take the comments made by a representative of this commission to point out the bearing of the decision in the great number of cases where fares are stipulated in franchise grants.

The finding of the court seems to be based on two fundamentals. The first is that it is impossible to find a word in the public service commission law which discloses the legislative intent to deal with a matter of rates fixed by agreement with local authorities. The second is that, while it is unnecessary and therefore improper to decide at this time what the limits of legislative power are in this connection, the consent of local authorities required by the New York Constitution for railway installation recognizes the cities as *pro tanto* independent of legislative control, and a franchise grant, once accepted, becomes a contract which neither the State nor its agencies can alter.

Hence, according to W. L. Ransom, counsel for the commissioners, it becomes the settled rule that, to increase a franchise rate, the consent of the municipality is necessary before the ordinary regulative power of the commission can be made effective. But what ordinary power would the commission possess in such a case, unless the city waived its right to stipulate the terms of modification? It is a ten-to-one shot that no city would do that. Mr. Ransom himself seems to appreciate how the city would feel, for in an interview he talks about the maintenance of a uniform, low fare being one of the most important benefits secured by a city in granting a franchise, and about the seriousness of depriving a city of the right to protect itself, by imposing suitable conditions and safeguards, upon any modification of fare.

In other words, if a railway is on the road to receivership because of a fixed 5-cent fare, as many are, let it beg the city for relief! When the dickering is over, what will the commission have to say about it? If the board has no power over the original franchise provisions, on account of the constitutional right of the city to contract, it certainly has none over the modified grant.

So hurrah for the good old days of bargaining in New York State! Mr. Ransom says that the decision of the Court of Appeals is in accordance with a common-sense concept of justice and a sound municipal policy. He is wrong. The decision is based on a narrow-minded

legalism. As far as sound municipal policy is concerned, the court naturally took no account of such a question, for its opinion relates entirely to the legal interpretation of constitutional and statutory phrases. To follow Mr. Ransom's example, however, and interpret the decision from the point of view of policy, we can only say that it opens the way to the worst sort of municipal policy—that which postulates community prosperity upon utility oppression.

The State and its utilities are now left in a quandary, from which both in their common interest should endeavor to extricate themselves. What can they do? From the first reports of the decision it seems that an appeal to the United States Supreme Court for a different interpretation can be made, or legislative action and a popular vote for a constitutional change can be invoked to secure amendments to the law, or the cities individually can act to provide relief. Something must be done, for the railways cannot operate below cost. They need relief, and they need it now.

## Make It Easy for the Short-Haul Rider to Use Your Cars

AN OLD and very important fact of railroad history is emphasized in a report recently made on the methods and practices of the Boston Elevated Railway Company. "One of the most valuable assets of any street railway system," it says "is the short-haul rider. In fact, it has enabled many of the railways in this country to maintain a flat rate of fare, and to carry many a long-haul rider at a loss."

This report points out that when the Boston company abandoned some of its surface lines in the business district and went below the street into subways it paved the way for improved service but at the same time "it lost much that it may never in all probability be compensated for." By this is meant the short-haul rider—the cream of the traction business.

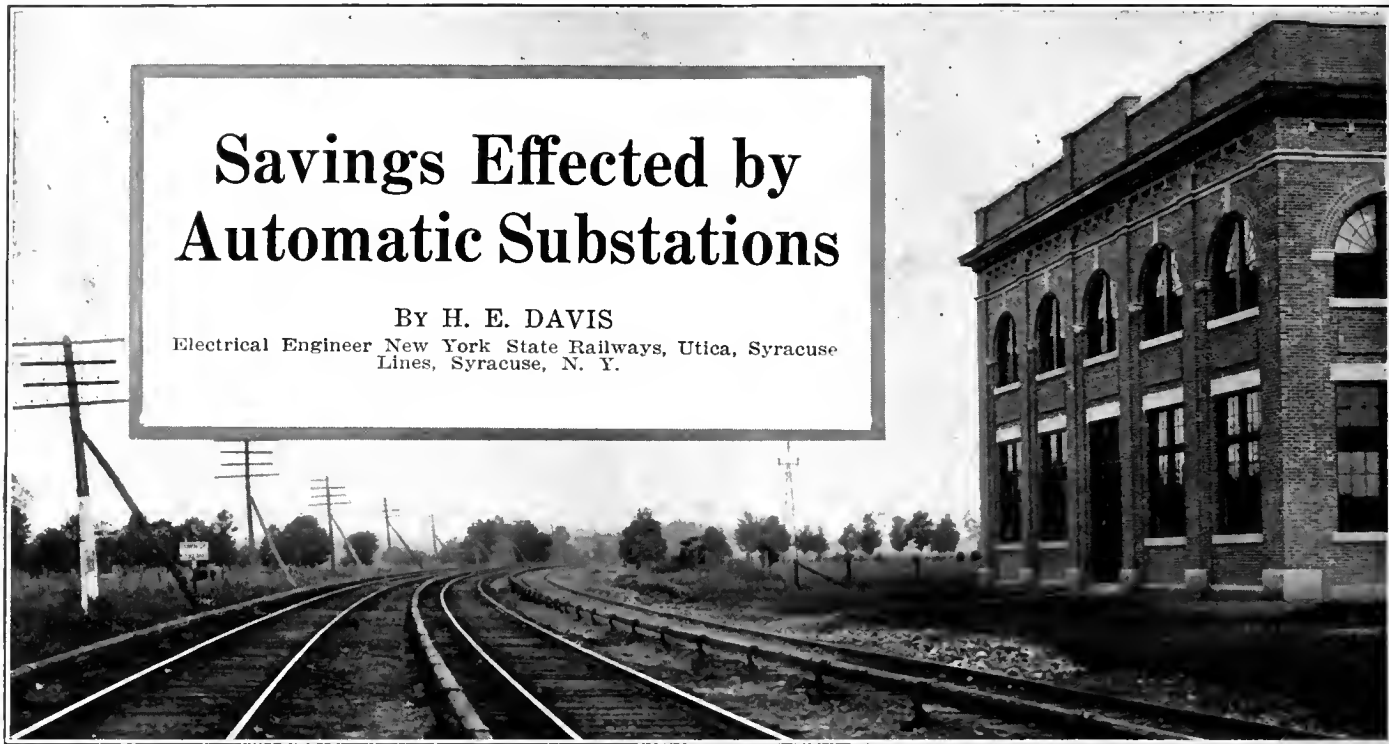
This truth must be faced in every city where the clamor arises for rapid transit. The arrangement of streets in Boston—like that of London—undoubtedly called for relief which could only be had by placing a large number of cars underground in the congested territory. However, the subway habit grew beyond bounds and the story is best told in the figures which show for twenty years a tremendous increase in permanent investment accompanied by only a slight increase in gross earnings.

People who have to ride long distances like to cover the ground rapidly, and for this reason the demand for elevated and subway lines grows. It must always be kept in mind, however, that neither a subway nor an elevated structure is as accessible as a surface line, and the person who wishes to go a few blocks is more readily attracted by the car into which he can step without difficulty. The same point holds good with reference to rerouting of cars or extension of lines. Lack of proper judgment in changes of service may easily result in loss of patronage of short-haul riders. The dividends are not in the straps, although a railway man was quoted to that effect some years ago. The dividends—if there are any—may be found rather in the number of short-haul riders using the cars.

# Savings Effected by Automatic Substations

By H. E. DAVIS

Electrical Engineer New York State Railways, Utica, Syracuse Lines, Syracuse, N. Y.



TYPICAL VIEW OF ONEIDA LINE OF NEW YORK STATE RAILWAYS

THE New York State Railways, Utica-Syracuse lines, has purchased automatic control for its Manlius Center substation on the Oneida line, a third-rail system operating over the electrified division of the West Shore Railroad between the Utica and Syracuse city lines. This division is 44 miles in length, of which 30.5 miles are double-tracked, 8.8 miles are laid with three tracks and 4.7 miles have four tracks. The running rails are 80 lb., bonded with No. 0000 compressed terminal bonds. The third-rail is 70 lb., with 500,000-circ. mil ribbon bonds soldered to the head of the rail, and is of sufficient area to carry the current without additional feeders.

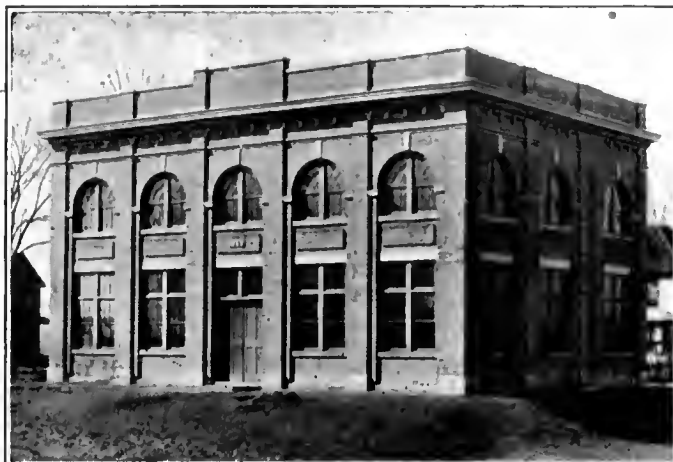
There are four substations, located 10.75 miles apart and having capacities as shown in Fig. 1. Clark Mills substation (No. 1) is 6.2 miles from the Utica city line, and Manlius Center substation (No. 4) is 6.1 miles from the city line of Syracuse. Vernon substation (No. 2) and Canastota substation (No. 3) are the intermediate substations. The original capacity of the substations was 600 kw., each containing two 300-kw. units. In 1916 one unit was transferred from Manlius Center substation to Vernon substation to take care of the additional load at the latter point. It was possible to remove one of the units from Manlius Center as the Syracuse lines help feed this section. Also the automatic feature was taken into consideration as the current-limiting resistance of the automatic substation will

allow three-car trains to pass this station without overloading the machine.

The service required of the substations on this line is very favorable to the use of automatic control. The headway permits the shutting down of the converters a considerable part of the time, thus making a distinct saving in the light-load losses. This is especially true of Manlius Center substation, for many of the trains pass at this point, the headway between local and limited trains is less in this section, and the substation is located considerably nearer one of the substations in Syracuse than the distance between substations on the Oneida lines. The busbar voltage at Syracuse is 650, whereas on the Oneida line it is 620. This allows the Syracuse lines to feed considerable power to the Oneida line through a connection at the junction of these lines.

Probably the most interesting feature of this installation is that, of the four substations on the Oneida line, three of which were considered as automatic substation possibilities, the net saving effected by making one of

them automatic is greater than by operating two or three automatically. This is true with conditions as they now exist, but a change in the hours of labor, wage rate of substation operators, schedule, capacity of the substations, transmission line voltage or a combination of these might make automatic operation of more than one substation more economical. The substation operating force works in two shifts. There are eight substation



EXTERIOR OF MANLIUS CENTER SUBSTATION WHICH IS BEING MADE AUTOMATIC

operators, one chief operator and one shift operator, the latter devoting only part of his time to the Oneida lines and the remainder to the Syracuse lines.

Power is supplied from the Adirondack Electric Power Corporation's 6000-kw. steam turbine plant at Utica. It is transmitted at 60,000 volts. The trans-

under Plan C, by five men. The reason for this is that under Plan A the chief operator can look after Manlius Center substation without neglecting his regular duties. If two substations were made automatic, as under Plan B, the services of an extra man would be required. Under Plan C the same man who was retained to take

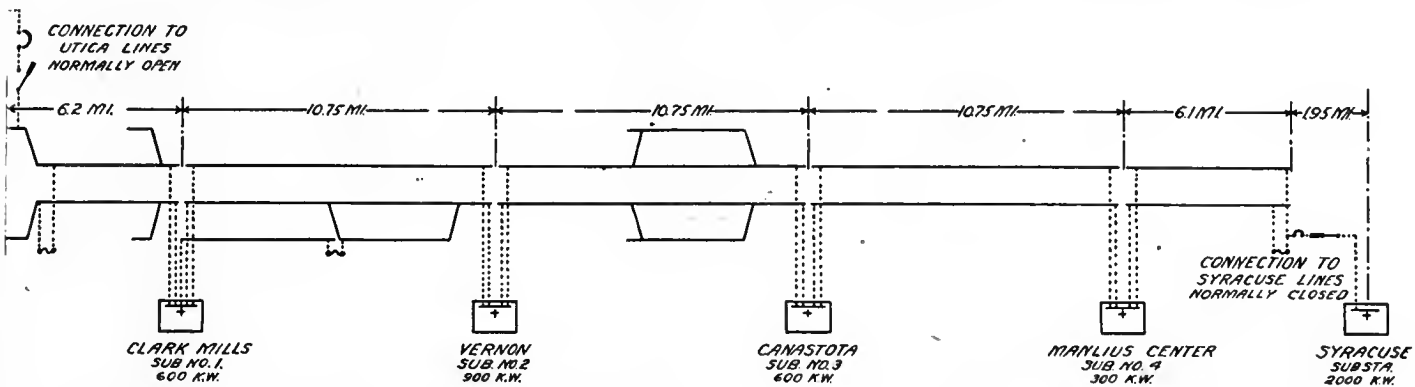


FIG. 1—LOCATION OF SUBSTATIONS AND THIRD-RAIL LAYOUT ON THE ONEIDA LINE, NEW YORK STATE RAILWAYS

formers are Y-connected on the high-tension side, and the neutral is grounded. This connection has proved very satisfactory, as in case of a ground on the high-tension line the affected leg is cut out and the transformers operate open delta, using two wires and the ground.

The car equipment consists of sixteen 40-ton passenger cars equipped with four GE-72 (75 hp.) motors with type M control, two 38-ton passenger cars equipped with four GE-201 (60 hp.) motors and two 45-ton express cars equipped with GE-73 motors. Cars are operated singly and in two, three and four-car trains. Trains of three cars are operated over the entire length of the road and four-car trains are operated only in the vicinity of Vernon substation. Trains of more than two cars are operated with one motor car used as a trailer. The starting current is approximately 325 amp. per motor car, and is practically the same for trains of three motor cars and one trailer. The average headway is thirty minutes in each direction, but this varies throughout the length of the road on account of the local and limited service. This is shown by the train sheet reproduced in Fig 2 on page 694.

In considering the economics of automatic control equipment as applied to the existing substations of this line the five items of importance were the saving in labor, the saving in light load losses, the transmission line voltage, the number of units in each station and the reliability of automatic equipment. Three possible plans were considered:

Plan	Substation	Automatic Units
Plan A	Substation No. 4	One 300-kw. unit automatic
Plan B	Substations Nos. 3 & 4	Three 300-kw. units automatic
Plan C	Substations Nos. 2, 3 & 4	Six 300-kw. units automatic

Substation No. 1 was not considered for automatic operation as power is purchased at this point, and it was considered necessary to have a man continuously on duty in charge of transmission lines and other details.

It will be noted that the number of operators released is not proportional to the number of substations made automatic. Under Plan A, the operating force is reduced by two men; under Plan B, by three men, and

care of substations No. 3 and No. 4 of Plan B with the help of the chief operator could take care of substations Nos. 2, 3 and 4 of Plan C.

PLAN A	
Cost of automatic control equipment, one 800-kw. unit installed	\$4,000
Cost of building changes (bars for windows, etc.)	300
Total cost	\$4,300
Labor, two men	\$1,800
Light load losses	400
Coal for heating	150
Gross annual saving	\$2,350
Repairs to automatic equipment	\$100
Fixed charges at 15 per cent.	645
Total additional annual expense	\$745
Net annual saving	\$1,605

PLAN B	
Cost of automatic control equipment, three 300-kw. units installed	\$12,000
Cost of building changes (bars for windows, etc.)	600
Total cost	\$12,600
Labor, three men	\$3,700
Light load losses	735
Coal for heating	300
Gross annual saving	\$3,735
Repairs to automatic equipment	\$250
Fixed charges at 15 per cent.	1,890
Additional line loss	500
Total additional annual expense	\$2,640
Net annual saving	\$1,095

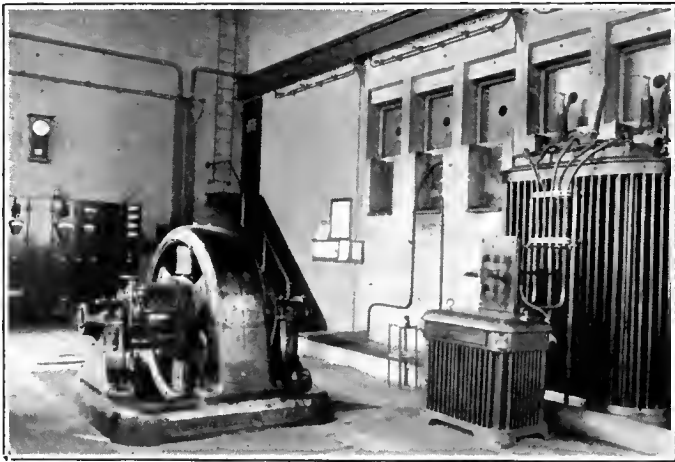
PLAN C	
Cost of automatic control equipment, six 300-kw. units installed	\$24,000
Cost of building changes (bars for windows, etc.)	900
Total cost	\$24,900
Labor, five men	\$4,500
Light load losses	1,125
Coal for heating	450
Gross annual saving	\$6,085
Repairs to automatic equipment	\$450
Fixed charges at 15 per cent.	3,735
Additional line loss	500
Total additional annual expense	\$4,685
Net annual saving	\$1,400

SUMMARY		
	Total Cost	Net Annual Saving
Plan A	\$4,300	\$1,605
Plan B	12,600	1,095
Plan C	24,900	1,400



The coal saved in heating the substations does not include all the coal used, as some heat would be required with automatic operation for the men who would have to work in the stations part of the time. Electric heaters would probably be substituted for coal, but the net saving would be as given. The light load losses vary with the location of the substations. This can be seen from the train sheet. The time that substation No. 4 would be shut down with automatic operation can be found also from the voltage chart, Fig. 4. This is a voltage record taken with substation No. 4 shut down. The light load losses for the additional units in substations Nos. 2 and 3 are, of course, less than those of the first unit, as more than one machine are operated for only a small part of the day.

The item of additional line loss under Plans B and C requires some explanation. As given in the description of the system, the transmission line is now operated at 60,000 volts with Y-connected transformers. In case one leg is grounded, the affected leg is cut out by the



INTERIOR OF MANLIUS SUBSTATION, NEAR SYRACUSE, N. Y., SELECTED FOR AUTOMATIC OPERATION

operators. To do this automatically would require additional apparatus. Another and better solution would be to operate the line at 34,000 volts with transformers connected in delta. This would increase the line losses by \$500 annually, as given under Plans B and C. This is unnecessary under Plan A, as the voltage is not seriously affected with Manlius Center shut down. It should be understood, however, that there are other conditions which were considered. The 60,000-volt insulators have been in use since 1907 and develop considerable trouble during the lightning season. Removing the grounds from the system and operating at the reduced voltage would be of considerable advantage. However, the change is not now contemplated and the entire line loss is charged up to the change to automatic substations. However, if this item were replaced by the fixed charges for additional automatic equipment it would not materially affect the result.

After determining that it is more economical to operate under Plan A than under Plans B or C, it is

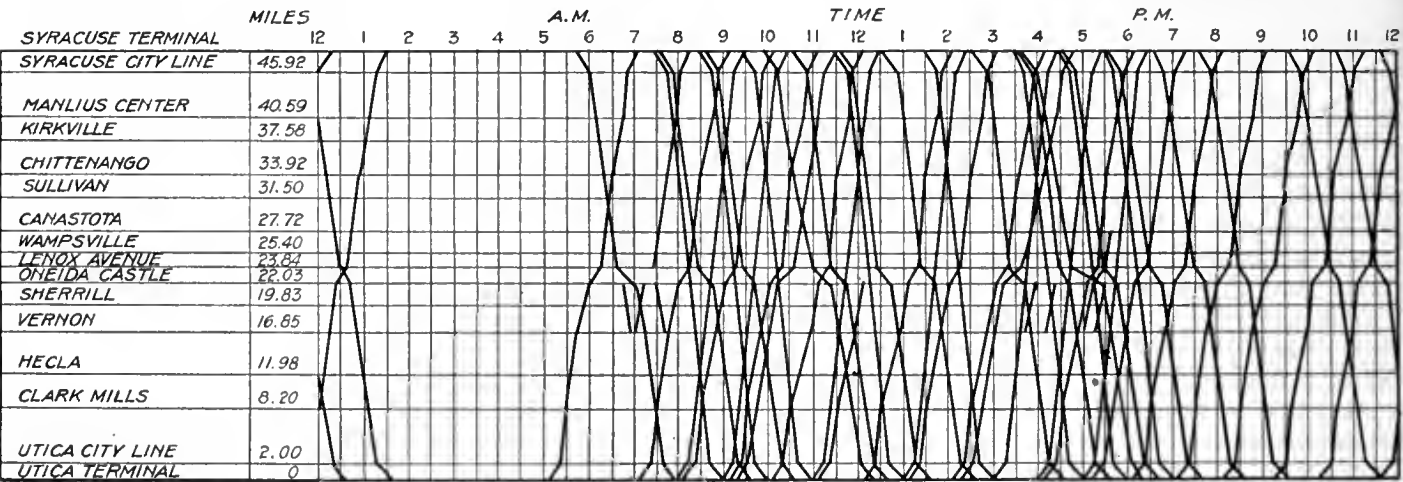


FIG. 2—TRAIN SHEET, UTICA TO SYRACUSE, NEW YORK STATE RAILWAYS

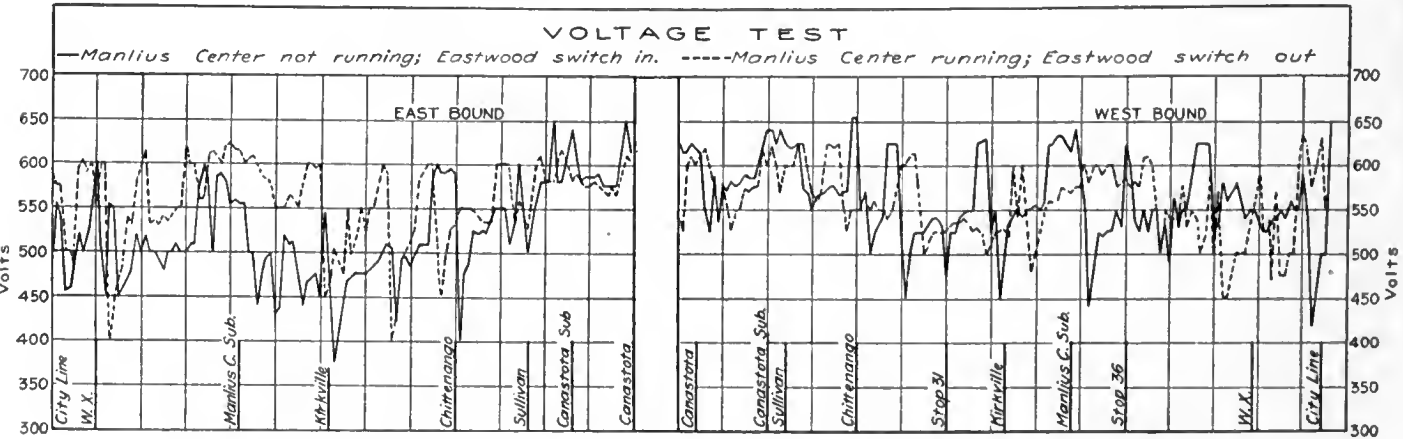


FIG. 3—RESULTS OF VOLTAGE TESTS ON ONEIDA LINE, NEW YORK STATE RAILWAYS



necessary to consider the reliability of automatic equipment for Plan A only. Considering this equipment in itself to be as reliable as the single converter and transformer unit, and that it adds to the reliability of the station as a whole due to the limitation of the load through the use of current-limiting resistances, it is still necessary to consider that this station might be shut down due to the failure of automatic equipment or to the converter itself.

Fig. 3 shows the voltage with Manlius Center running and Eastwood switch open, and vice versa, the Eastwood switch being the connection between the Syra-

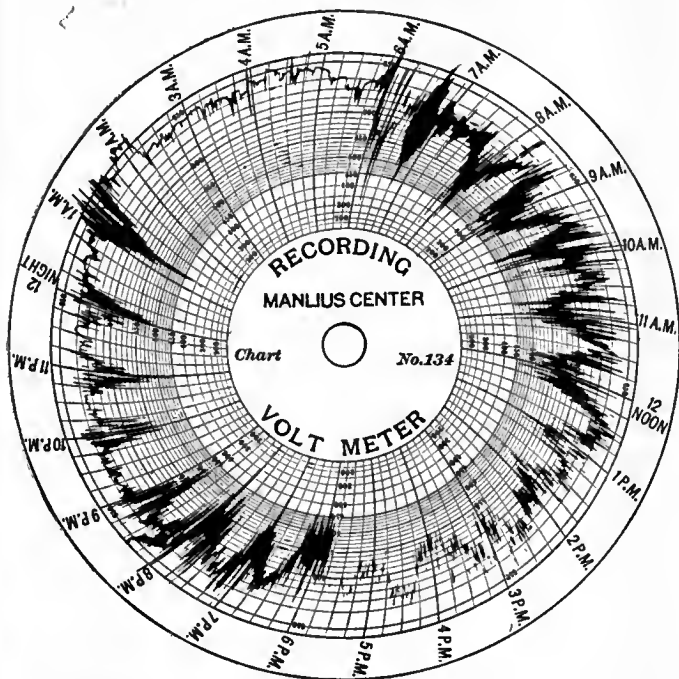


FIG. 4. VOLTAGE CHART, MANLIUS CENTER SUBSTATION IDLE

cuse lines and the Oneida lines. Previous to 1915 this switch was normally left open. The graphs in the figure show that the average voltage is not greatly reduced with Manlius Center shut down. The loss of time to trains is approximately two minutes.

The shutting down of substation No. 2 or No. 3 would delay trains considerably. If this were a new proposition, it would permit ready solution. The distance between substations could be reduced so that an interruption to one station would not seriously cripple service. On account of the reduced cost of automatic substation buildings and the fact that, due to load-limiting resistances, the shifting center of load could be taken care of by practically the same substation capacity as is now installed, the proposition of making all but one substation automatic could be made financially attractive.

The March issue of *The Annals* of the American Academy of Political and Social Science discusses "War Adjustments in Railroad Regulation." The contributors are authorities in the railroad world, public life and academic circles. The articles cover various phases of the steam railroad situation, such as the trial of railroad regulation, war pressure for adequate service, present effects of war control, plans for adjustment after the war and the continuing problems of public policy.

## Up-to-the Minute Information on Class-T Locomotives

An Amplification of the Statements Regarding New York Central Locomotives, Made by E. B. Katté at Recent New York Railroad Club Meeting

AT THE LAST electrical night of the New York Railroad Club, papers were presented on late locomotive design. In speaking of the last electric passenger locomotives received by the New York Central Railroad, E. B. Katté, chief engineer of electric traction, referred to some minor modifications and improvements made from the earlier Class-T locomotives purchased by this road, but no details were given. These changes were of a most trivial nature, consisting chiefly of small mechanical alterations made to provide better construction, to standardize parts and to give increased safety to the operators. They had no bearing on the performance of the locomotive in service.

The following list of some of the more important changes will give an idea as to their nature:

Ventilating louvres changed slightly and baffle plates added to keep out snow and rain.

Blower and its motor assembled on one base.

Magnetic screen under main motors constructed with more sections to make handling easier.

Sand-box seams welded to make box moisture-proof.

Sanding pipes arranged with straight runs.

Better method provided for lubricating center pin.

Movable section provided in hand rail at center of cab for easier access.

Better support and armor provided for motor leads.

More convenient clasps and handles for doors provided.

Rubber stops placed on sliding windows.

Tool box arranged with fuse compartment to make fuses more accessible and prevent them from rattling around.

Contact-shoe paddle holders provided with felt to prevent rattling.

The data for power consumption, maintenance cost and the average mileage obtained per locomotive detention as given by Mr. Katté in his remarks at the Railroad Club and published in the *ELECTRIC RAILWAY JOURNAL* of March 23 show the excellent results being obtained from this class of locomotives. These figures were for the year 1917 and the costs were somewhat higher than previous records, due to the advance in the prices of labor and materials.

A performance test with one of these locomotives was made on March 24. Four trips arranged to represent the most severe service requirements were made between the Grand Central Terminal and Harmon, with one stop at Yonkers. This service consisted of hauling a thirteen-car train weighing 1022 tons for three trips and a fourteen-car train of 1100 tons on the fourth trip from Harmon to Grand Central with a thirty-minute layover at the end of each of the runs. A maximum average schedule speed of 62 m.p.h. was made.

By means of an exploring coil installed in one of the motor windings, readings were obtained to indicate the temperature of the motors, and other readings of temperature were made at the end of the runs with thermometers. The maximum temperature rise in the motors with forced ventilation was well within the specification limits, which is 75 deg. C. measured by thermometer and 100 deg. C. measured with an exploring coil. Considering the severe character of the service, the results obtained were very gratifying.

# Fare Increases Blocked in New York

Highest State Court Rules that Commission Law Does Not Provide for Regulation of Rates Fixed in Franchises—Moreover, Constitutional Consent Requirement Makes Grants Unalterable Except with Municipal Permission

THE control of public service commissions over electric railway rates has been sadly reduced in New York. Under a decision just rendered by the leading court of the State, the Court of Appeals, the power of the commissions to grant higher fares to deserving railways is in general restricted to those cases where the rates are not fixed in franchises.

In interpreting the existing New York law, the court finds that the public service commission act does not disclose any intent to provide for the regulation of franchise rates, although it permits the revision of rates fixed by old statutes. Moreover, although it is said to be unnecessary and therefore improper to decide now the limits of legislative power over franchise rates, the court states that such rates fixed in accordance with the constitutional requirement of municipal consent for electric railway operation are not subject to legislative alteration.

## DECISION IS OF WIDE IMPORTANCE

This decision of the Court of Appeals was handed down on April 5 in the case of *Quinby vs. the City of Rochester*. The case arose through the denial by lower courts of a writ of prohibition to prevent the Public Service Commission for the Second District from exercising jurisdiction over the petition of the New York State Railways for a 6-cent fare.

It will be recalled that the Second District Commission last autumn, as noted in the *ELECTRIC RAILWAY JOURNAL* of Nov. 24, 1917, ruled in the *Huntington Railroad* case that it had power to increase franchise rates, in accordance with a preceding decision of the New York Appellate Division for the Third Department. Last January, however, the First District or New York City Commission (E. R. J. Jan. 19) took a diametrically opposed stand in the *New York & North Shore Traction Company* case.

It was expected that the latter case might be appealed, but the *Rochester* case was speedily carried to the Court of Appeals on the legal questions involved, and parties interested in the *North Shore* decision were allowed to intervene therein. Consequently the parties heard in the *Rochester* case included the city of Rochester, the New York State Railways, the Second District Commission, the city of New York, the New York Railways and the First District Commission.

The Court of Appeals decided that the Second District Commission is without jurisdiction in the *Rochester* case, and that an absolute writ of prohibition should be awarded. The decision was written by Judge Pound, with Judges Cuddeback, Cardozo and Andrews concurring. Judge Crane concurred in the opinion in so far as it stated that the Legislature has not in this instance given to the commissions the power of regulation, but he thought that the reserve police power of the Legislature had not been contracted away. Chief Justice Hiscock and Judge Collin dissented.

The decision of the court, in unrevised form, has been available for consultation, but the finding has not been released for full publication. Consequently the *ELECTRIC RAILWAY JOURNAL* is not able to present a detailed abstract this week. An idea of the contents of the decision, however, can be secured from summaries given out for newspaper publication and from comments by counsel of the First District Commission.

## COMMISSIONS HAVE NO JURISDICTION OVER FRANCHISE RATES

According to published quotations, the three basic points covered by the decision seem to be as follows:

### 1. Statutory Rates

"The purpose of the Legislature was to prescribe for the regulation of statutory fares by a board which may be expected to pass equitably upon conflicting claims with the single purpose of the common good, even where a maximum rate had been fixed by the Legislature.

"Rates so fixed by special statute are still subject to regulation by the public service commission. The jurisdiction of that body over such rates is not to be reduced by implication. The legislature merely fixed the rate *pro tempore*."

### 2. Constitutional Barrier

"The consent of the local authorities being obtained, what jurisdiction has the Legislature conferred upon the public service commission to regulate rates by increasing the rate agreed upon?

"It has been held invariably and in a legion of cases that the power to establish rates is not essential to the consent of local authorities and will not be implied, and that the Legislature is at all times supreme in the matter. In all such cases, however, the question was one of unrestricted legislative power, policy and discretion over a city or town where the local authorities were held to be mere instrumentalities through which the State exercised its sovereign power. The paramount power of the Legislature over the subject of fares was upheld in the absence of a constitutional limitation.

"But the consent of the local authorities required by our Constitution recognizes our municipalities as *pro tanto* independent of legislative control, exercising some fragment of power, otherwise legislative in character, which has been thus irrevocably transferred by the fundamental law from the Legislature to the locality.

"The grant by the municipality of authority to use the streets is not a mere privilege or gratuity. Once accepted, it becomes a contract which neither the State nor its agencies can impair.

### 3. No Power Granted to Commission

"It is, however, unnecessary and, therefore, improper to decide at this time what the limits of legislative power are in this connection. In the absence of clear

and definite language we should not unnecessarily hold that the Legislature has intended to delegate any of its powers in the matter, whatever its powers may be. It is impossible to find a word in the statutes which discloses the legislative intent to deal with the matter of rates fixed by agreement with the local authorities."

#### HOW COUNSEL INTERPRETS THE DECISION

W. L. Ransom, counsel for the First District Commission, interprets the decision as follows:

"The Court of Appeals has definitely sustained the view of this commission that where a rate of fare has been fixed by the terms of franchise agreement between an electric railway corporation and the city, the commissions do not possess power, in the absence of the city's consent to such a modification of the franchise contract, to advance the fare above the franchise maximum. The court has likewise held that the authorities of a municipality may validly, under the Constitution of the State, require an electric railway to agree to maintain a stipulated rate of fare, as a condition of granting the city's consent to the construction of the railway along public streets, and the court has ruled that the grant by the municipality, once accepted, becomes a contract which neither the State nor its agencies can impair.

"The court has even gone farther than this commission and has ruled that as to electric railway franchises antedating the constitutional amendment of 1875, and other franchise contracts not entered into in pursuance of the constitutional provision and so under its protection, the commission has not been vested by the Legislature with power to advance the rates fixed in such franchises, although the court makes it clear that as to franchises outside the constitutional protection, the Legislature could confer such power on the commission if it saw fit.

"It thus becomes the settled rule that power to advance electric railway fares, directly or indirectly, above a figure fixed in a franchise, does not repose in this commission alone, and those who seek to accomplish, directly or indirectly, such a variance from the franchise terms must seek consent or modification from the municipality with which they made their solemn contract, rather than from the commission. To increase a franchise rate above the franchise figure, the consent of the municipality is necessary before the ordinary regulative power of the commission can be made effective."

#### DECISION AGREES WITH SOUND CITY POLICY

In commenting further upon the meaning of the finding, Mr. Ransom says:

"The decision is in accord with a common-sense concept of justice and a sound municipal policy. It only means that the city, which granted the franchise, is left with power to protect its citizens, in imposing terms and conditions of modification. The maintenance of a uniform, low rate of fare is one of the most important benefits secured by the city in granting a franchise. The First District Commission has felt as a matter of law and policy, and the Court of Appeals now agrees as a matter of law, that the company may not take away this important consideration as to fare, without the city's having the right, power and opportunity to re-

quire other concessions, perhaps of equivalent benefit to the public, as a condition of consenting to an increase in fare, even temporarily.

"No one will question that the surface railways of New York ought to be empowered to charge more than 5 cents, if that rate of fare is found to be inadequate. But there is a serious question whether, in order to bring this about, the Constitution and the law should be so construed as by judicial decision to deprive the city of New York of power to protect itself and its people, through imposing suitable conditions and safeguards, upon any modification of the rate provisions of the franchise contracts."

#### The Situation is Grave

IN THE matter of the Court of Appeals decision, Joseph K. Choate, chairman of the committee on increased revenues of the New York Electric Railway Association, has issued a statement in part as follows:

"The decision of the Court of Appeals is a matter of as grave concern to the United States government and to the communities themselves as it is to the electric railways. It means, unless the condition thus produced is immediately corrected, that the transportation utilities of the State cannot render that assistance to the nation's war program which recent pronouncements of President Wilson, Secretary McAdoo and Comptroller Williams declares to be urgent and necessary.

"It means that these utilities will no longer be able to furnish to the public the kind and extent of service needed to further the growth and prosperity of the communities in which they operate, for properly to provide for the convenience and comfort of their patrons.

"It means decided interference with the plans of the national government, under which the war finance corporation was to provide means to enable railways to secure the absolutely necessary new capital for refunding maturing obligations, since the co-operation of the states and communities in securing to the borrowing companies a rate of return which would give stability to the securities pledged with the war finance corporation was a fundamental of the plan.

"The need of relief is as imminent and pressing as ever. The Court of Appeals decision simply means that the theory of regulation as applied in New York State has broken down in an emergency, and that some other method must be adopted to meet conditions which threaten to hamper the usefulness of transportation utilities at a time when their increased efficiency is vital to the nation and to the public."

#### Fare Cases Are Held Up

THE foregoing decision of the Court of Appeals will not, of course, help the progress of the fare relief movement in New York State. The Second District Commission has already granted higher rates in about ten cases, and at least three authorizations are now nullified because of franchise provisions. Hearings have been almost completed in six other cases, some of which involve franchises. Several other companies have petitioned for relief from fixed rates. In many cases, therefore, the Second District Commission now finds itself

# Prepare Your Commission Cases Thoroughly\*

Regulating Bodies Must Have Carefully Prepared Exhibits and Full Statements of Facts—  
The Function of Public Service Commissions Is to Check,  
Not Originate, Utility Data

By HAROLD L. GEISSE

Secretary Wisconsin Railroad Commission, Madison, Wis.

ONE of the most frequent criticisms of the Wisconsin Railroad Commission, perhaps the most frequent one, is that of delay in rendering decisions. The commission itself is ready to admit that it is often unable to dispose of matters with that dispatch which would best subserve the interests of the public and the utilities. The delay in a large percentage of cases is due to inability to arrive at a conclusion as to the merits of the controversy from the evidence introduced. If a better understanding of the method of preparing and presenting a case could be given, a much greater volume of business could be handled in a much reduced time.

In a great majority of cases after the hearing and upon review of the transcript of testimony, the commission is obliged to resort to an inquiry into the books of the company and a statistical analysis of the operating performance for some years back or lengthy service investigations to secure the facts upon which to determine whether or not the relief sought is justified. Moreover, in a fair percentage of the cases the record of the hear-

ing is incumbered with a mass of irrelevant testimony, inexpert opinions and even vituperation, to which the commission has been obliged to sit patiently and listen.

One of the recurring incidents in the holding of hearings is the attempt to influence the judgment of the commission by the introduction of prejudicial matter. The tendency of attorneys to avail themselves of any advantage in this method does not fail to appear in the trial of cases before the commission. It is a method to be deplored, totally ineffective and unworthy of notice by opposing counsel.

The commission is not a court of law. It is an administrative body concerned in accounts, in operating statistics, in unit costs, in prices of materials and supplies, in coal costs, in values of property, in measurements and surveys, in traffic counts and in the opinions of experts.

One cannot attempt to outline a procedure for each

\*Abstract of address delivered before Wisconsin Electrical Association at Milwaukee on March 27.

(Concluded from page 697)

powerless to grant the needed aid, unless the cities give their consent.

The First District Commission has not granted any higher fare, for in the first case decided, that of the New York & North Shore Traction Company, it announced its lack of power to give the relief proved necessary. Two applications are now before it for a higher unit fare, in the case of the Staten Island Midland Railway and the Richmond Light & Railroad Company. Hearings for these were scheduled to begin on April 8, but at that time Mr. Ransom read into the record a statement that hearings should not be initiated at all, even if the applications were not withdrawn by the companies, until the city consented to franchise modifications.

Hearings on the application of the Third Avenue Railway and other systems in New York City for a 2-cent transfer charge were to have been continued the next day, but Mr. Ransom stated his views in regard to the transfer cases as follows:

"It would seem that the ruling of the Court of Appeals stands in the way of granting an additional charge for transfers between different lines of a single company, such as, for example, the New York Railways, for that would be to sanction a charge of 7 cents where the company has apparently agreed with the city not to charge more than 5 cents. The ruling would seem likewise to deter the prosecution of any application by a surface railway system, to obtain an extra charge for transfers on a system basis, as a means of obtaining an increase in fare.

"To be concrete—as to the various operating com-

panies of the Third Avenue Railway system, I do not now believe that, in the absence of the city's acquiescence or suitable modification of the contract on agreed terms, a charge for transfers could be granted the Third Avenue system, on the basis of a 'lump' valuation of the system property and a 'lump' statement of the system earnings and expenditures.

"As to certain points where transfers are exchanged between different companies of the Third Avenue system, and where the obligation for such exchange does not arise from common use of tracks or similar necessity, I am not now sure that, upon a proper showing as to the properties and financial operations of the individual companies concerned, a new joint rate might not be established by order of the commission, as to such points, and an additional charge for transfers at such points approved, if the facts warranted it. Upon that question I would prefer to withhold opinion until the question has been more fully considered and argued."

Mr. Ransom suggested that the companies be allowed to study the Court of Appeals decision for two weeks and then present oral argument as to any relief which in their opinion the commission might still grant. He also suggested that each company be directed to file a detailed statement showing each transfer point to which the pending application is deemed to relate, and the precise way in which the present exchange of transfers at that point is deemed to have arisen—i. e., through a trackage agreement, an order establishing a joint rate and through route at the point of intersection, voluntary action of the railway or otherwise. Accordingly the commission set April 17 for the submission of data and April 22 for the oral argument.



kind of case that may come before the commission. A service case will differ much in its method of presentation from a rate case. To illustrate how plain and matter-of-fact a case may be made, however, take in its simplest form a typical rate case.

The elemental question with which the commission is concerned in a rate case is the determination of the value of the property used and useful in the service of the public. In determining the ultimate fair value, the physical value of the tangible property, the amount of going value and the necessary working capital must all be considered.

The opportunity to affect the judgment of the commission commences with the engineering appraisal of the physical value. The engineers of the commission have returned their report upon the physical value, and copies have been submitted to both sides. It is possible that the engineers have overlooked some element of the property, have failed to allow for construction mishaps which increased the expenditures or have allowed too liberal a value for the land or other elements. On any of these points the commission would be glad to have enlightening testimony. Possibly a contention would be in point at this juncture that the amount allowed for engineering and superintendence during construction is excessive or inadequate, and the testimony of experts or persons who are familiar with the history of the plant during the period of its construction would be of material assistance.

With the testimony on the physical valuation concluded, the amount to be allowed for going value and working capital are proper subjects for consideration. The various theories of computing going value as discussed in text-books, prior decisions and monographs of experts furnish a fertile field of inquiry for persons preparing to present a case before a commission. Similarly the amount of working capital necessary to conduct any particular business is sufficiently vague and uncertain to give the litigants opportunity to present very helpful testimony.

#### ANALYSIS OF OPERATING COSTS IS NECESSARY

After the inquiry into the value of the property, an analysis of the operating expenses becomes necessary to determine that no improper charges are being included and whether or not the property is being fairly economically managed. If the case arises through a public attack on the rates charged, the representatives of the public will probably be able to present little testimony of any considerable assistance. Frequently testimony is introduced showing that the rates charged are in excess of those charged by other plants similarly situated in communities of approximately the same size. Such testimony is usually of little significance, because of the factors that make the amount of the investment and the operating costs vary in different communities.

If, on the other hand, the case arises through an application for authority to increase rates, the company should be able to present a thorough analysis of its operating costs and earnings. Prepared with sufficient care, such a statement can be of material assistance to the commission. Data relative to the degree of saturation, showing the kilowatt-hour sales and the gross earnings per capita, can frequently be shown with consider-

able effect. An interesting disclosure of the tendency of the business in general can be made by drafting lines showing the course of the gross revenue, the net earnings, the operating expenses, the kilowatt-hours sold, the car-miles run and other elements or activities of the business.

If it is desired to show the comparative course of the figures for such items, they may be reduced to their logarithmic equivalents and the lines drawn from the data thus produced. A system of logarithms being a system of ratios, the relation of the lines to one another may thus be made to appear very graphically. Run through a series of years, a chart of this character would show definitely the proportionate increase or decrease of the earnings or expenses. Many modifications of charts of this character may be designed to assist the commission in its studies of the facts presented. In placing these data in evidence an officer of the company should be prepared to explain them in detail, answering any questions relating thereto that may be propounded either by the commission or by representatives of the public.

Similar data should be provided for presentation in any service case, the object being held constantly in mind to cut down the amount of inquiry that the commission must make independently after the hearing before decision can be rendered. With the figures carefully compiled and explained at the hearing, only such investigation would be required as would satisfy the commission of the fairness with which they had been compiled, their completeness and the safety with which conclusions might be drawn from them.

#### COMPANY SHOULD PREPARE ITS OWN CASE

It is true that the commission has a more or less complete mechanism for the ascertainment of the facts. This is necessary in order that the evidence introduced in a case may be tested out by subsequent independent investigation, and that accounting and engineering assistance may be rendered to utilities and municipalities operating utilities. It is taking an advantage of the commission, however, for a utility to presume that the possession of a staff of engineers, accountants and investigators makes the commission an available agency for the investigation of the utility's affairs when the utility feels itself in need of higher rates or relief from service requirements. The utility, having full access to its own books, should prepare itself, before seeking relief, to draw its own conclusions as to its needs and the reasons therefor, and be in a position to convince the commission of the fairness of its cause.

A somewhat different situation exists when the public invokes the jurisdiction of the commission in securing relief from high rates or inadequate service. Then the complainant has not the machinery at hand to conduct its own inquiry, but is obliged to depend to a greater or less degree on the inquiries made by the commission after the fundamentals of its case are presented at the initial hearing. Even here, however, the person in charge of the case, be he city attorney or private counselor, should have a sufficiently well-prepared outline to present clearly the issues he wishes to draw and the grounds for the public belief that the relief asked for is justifiable.



# Designing and Operating the Substation for Maximum Efficiency

The Cedar Avenue Substation of the Cleveland (Ohio) Railway Was Furnished With a Large Number of Units to Permit the Operating Capacity to Be Varied to Meet Load Demands



LATEST POWER SUBSTATION OF THE CLEVELAND (OHIO) RAILWAY

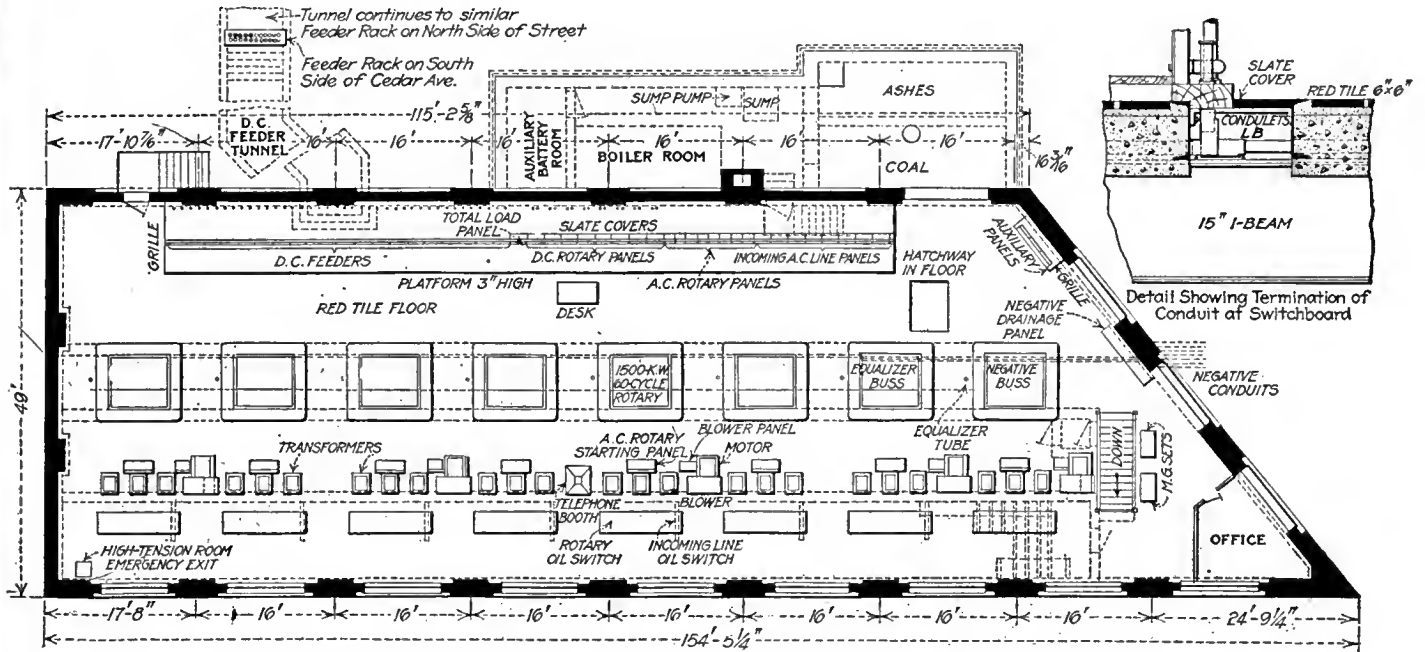
THE Cleveland Railway has recently added to its distribution equipment an eight-rotary substation on Cedar Avenue. This substation is located at one of the principal distribution points in the city, and in view of its large capacity and its importance the question will arise at once as to why so large a number of converter units were installed rather than a small number of larger capacity units. L. P. Crecelius, superintendent of power of the company, the designer of the substation, answers this question by stating his belief that much better economy could be secured in this substation by putting in a large number of small units (1500-kw. capacity) and cutting them in and out to follow the load line as closely as possible.

The governing idea in the layout of equipment in this station has been to simplify the construction and standardize apparatus, eliminating everything not necessary to safe operation. In standardization the substation is an integral part of the whole distribution system, the idea being to have all the substations so planned that a relief operator can step into any one of them and feel perfectly at home without special instruction. In other words, all operations are identical in all of the company's substations. This makes it possible, in "breaking in" new men, to start them in the smaller stations with lower pay and to work them up through larger stations. Thus in the course of promotion all that a man has to learn as he is transferred from one substation to another is the special feeder section layout.

The eight 1500-kw. units in the Cedar Avenue substation are 60-cycle, 514-r.p.m. Westinghouse machines, with characteristics practically identical with those installed several years ago at Windermere substation. These machines were described in an article on "Electric Power in Cleveland" printed in the issue of the ELECTRIC RAILWAY JOURNAL for April 5, 1913. At that time the design of the rotaries was considered quite novel. With this article was a map showing the power distribution system of the railway, a steam power station being indicated on the map at the site now occupied by the substation.

With the new installation the company now has twenty rotaries of 1500-kw. capacity each and two 1000-kw. machines. The controlling apparatus used with all of this is General Electric manufacture. The transformers are air-cooled Westinghouse 550-kva., 11,000/410-volt single-phase units installed without the shells. The oil switches, meters, switchboard equipment, etc., are for the most part of the standard types which have heretofore been used by the Cleveland Railway.

In the selection of eight 1500-kw. units the idea of following the load requirements closely by cutting in and out the machines, as mentioned above, was one of the principal considerations. Another was the fact that if four 3000-kw. units had been used instead of eight 1500-kw. units, 25 per cent of the total station capacity would have been lost if one machine had gone out of commission. Thus a serious overload might



GENERAL PLAN OF CEDAR AVENUE SUBSTATION, CLEVELAND RAILWAY

have been imposed upon the other three machines. A load of only 1500 kw., however, spread over seven other units would overload each unit very slightly.

The efficiency of the 1500-kw. unit is practically as high as that of the 3000-kw. unit, and the cost of two 1500-kw. machines is not much if any higher than that of one 3000-kw. machine. The slightly larger building required for eight of the smaller rotaries was not a factor for consideration in this case, as the length of building was practically controlled by the number of feeder panels necessary. The form of the particular lot used, also, was such that the building, built to fit the lot, gave a trapezoidal shape in which the longest side was used for the line of rotary converters.

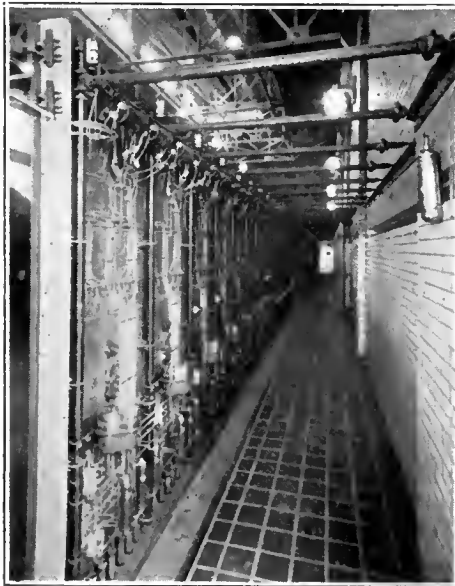
The station is designed at present to take care of the full requirements of the territory over which it was intended to distribute from this point. It is laid out simply to take care of the increase in traffic which may occur within the area served, for a certain period

ahead, and not for any which develops outside of this area. When more power capacity is needed additional stations will be put in. At present one of the rotaries really serves as a "spare."

#### BUILDING DESIGNED TO INSURE DRY INTERIOR

The substation building itself is set on a concrete foundation, both the basement floor and the main floor also being of concrete. The latter, however, is covered with a tile finish. The roof is of concrete supported on steel girders. Pressed brick is used for the front wall and the building is ornamented with cut stone trimmings throughout. The interior and side walls are of shale brick laid in cement mortar.

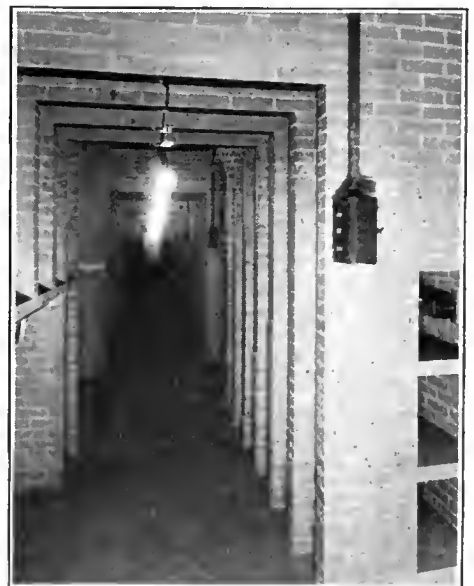
In connection with the design of the monitor sash, which like all other sash and doors are of steel, special provision was made to prevent leakage which might cause deterioration of machine insulation. In ordinary construction water is apt to drive into the building



Rear of Alternating-Current Section of Main Control Board



Rear of Direct-Current Section of Main Control Board



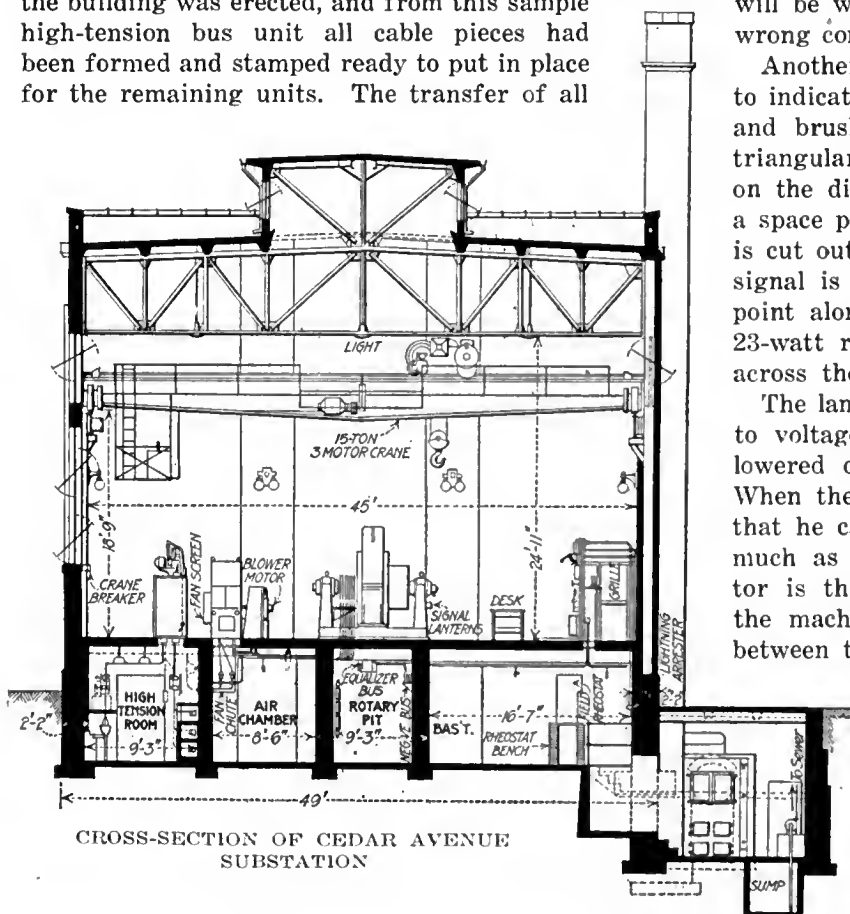
Busbar and Disconnect Switch Compartments With Lamp Indicators

VIEWS IN THE CONTROL SECTION OF CEDAR AVENUE SUBSTATION

during a storm through the cracks which are produced by the warping of sash. A certain amount of condensation also forms due to the difference of temperature inside and outside the monitor glass. This causes a dripping inside the station. In the present case to avoid this condition the concrete has been extended out from the girder and the copper flashing extended from the roof outside, up against the monitor wall, in under the steel sash and down inside the monitor wall, being bent up to form an interior gutter. The interior gutter can be distinguished at the base of the monitor walls in the accompanying cross-section. At certain intervals small copper outlets, 1 in. in diameter, are provided to drain the gutter, which takes care of all dripping from the monitor roof and sash.

#### SOME RAPID CONSTRUCTION WORK

After the substation building was completed and turned over to the electrical department all of the electrical apparatus, including rotaries, switchboards, etc., was put in by this department in a period of five weeks. It was possible to do this partly because a sample bus structure had been made up complete before the building was erected, and from this sample high-tension bus unit all cable pieces had been formed and stamped ready to put in place for the remaining units. The transfer of all

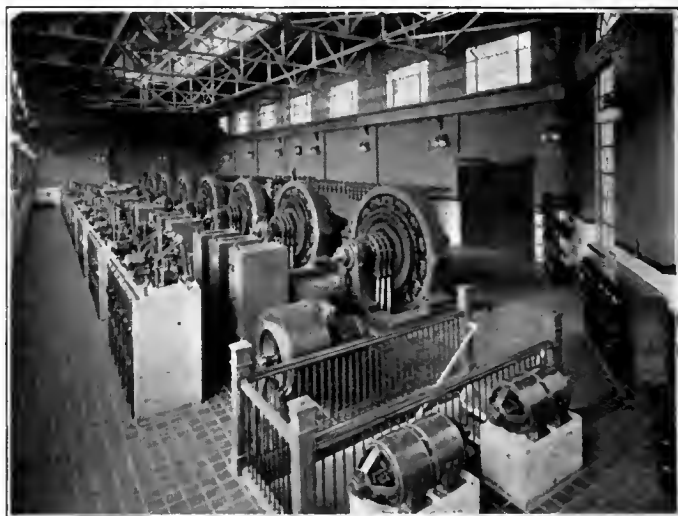


CROSS-SECTION OF CEDAR AVENUE SUBSTATION

feeders from the generating plant to the substation, and the testing out of lines and rotaries took but six hours.

#### SIGNALS OF VARIOUS KINDS A FEATURE

One interesting safety feature in the Cedar Avenue substation is an equipment of red and green switchboard lights in the basement along the aisle in front of the oil-switch and bus-structure compartments. These give either a red or green indication depending upon whether or not the bus compartment or switch is alive. The indicators have been provided as a protection to



ALTERNATING-CURRENT ENDS OF THE ROTARY CONVERTERS AND ROWS OF CONTROL APPARATUS

the men when they run downstairs from the switchboard to throw out a set of disconnect switches. If they forget which unit they intended to cut out they will be warned by the red right indicator in case the wrong compartment is opened up.

Another valuable indicator is one used on each rotary to indicate when it is up to speed, with voltage normal and brushes down. Attached to each machine is a triangular-shaped aluminum box bolted to the pedestal on the direct-current side. On either side of this, in a space provided for the purpose, the machine number is cut out and a ground glass is inserted inside. The signal is in view of the operator or helper from any point along the switchboard. Inside the box are two 23-watt ruby lamps, each in series with a resistance across the 600-volt terminals of the rotary converter.

The lamps are so wired that when the machine is up to voltage and the direct-current brushes have been lowered onto the commutator the lamps are lighted. When the operator sees the number in red he knows that he can throw in his main circuit breaker. Inasmuch as putting the brushes down on the commutator is the last step in the operation of starting up the machine, the light signals form a perfect check between the operator and the helper.

Still another valuable signal is one used in making certain that the operator gets the telephone signal when there is a call. It is always possible that on account of the noise of the rotaries the telephone bell may not be heard. A large lamp has, therefore, been placed on top of the telephone booth and a light signal in the base of the desk lamp on the operator's desk also. An ordinary drop

relay on the telephone circuit closes a 110-volt battery circuit through the bell and the lamps located on the booth and on the operator's desk. An office is later to be placed in the oblique corner of the substation for the use of the chief operator. This will be equipped with a telephone and a direct connection with the load dispatcher.

The plan followed by the Cleveland Railway in starting up rotaries is about as follows, the machines being always started up from the alternating-current side: The operator first throws in the oil switch and inserts

the potential plug for the voltmeter, turning the face of this instrument so that the helper can see it and bring up his field in the right direction. A check meter and a differential meter are both noted, these being duplicate in their functions and serving as a check against meter failure. The helper cuts in the machine by closing the field switch, equalizer and alternating-current starting switch, lowering the brushes last. When he does this the signal lanterns are cut into circuit as previously explained.

When the operator sees the lights he knows that the machine is up to speed and ready to go on the line. He then equalizes the voltage and for this purpose turns the voltmeter around so that he can see it while a second man checks on the correct potential. The machine is then brought up 10 or 15 volts above bus voltage and the machine is thrown on the direct-current line. The over-voltage prevents any reverse current flow into the machines which might act to operate the reverse-current relay on the direct-current side should the machine voltage be equal to or very slightly below the bus voltage.

INSURING RELIABILITY IN SWITCHING AND DISTRIBUTING THE SUBSTATION ENERGY

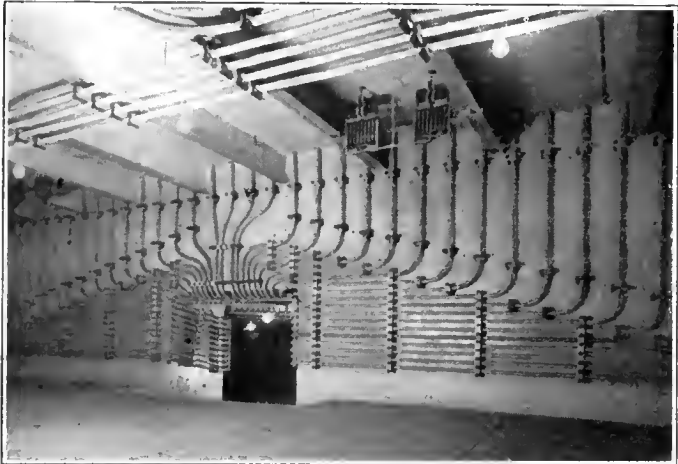
The bus construction in the substation is arranged to care for the incoming line, oil switch, etc., for each unit, grouping them together, and separating them from the compartments provided for the adjacent machines.

The incoming cables are No. 0000, grounded-neutral, 11,000-volt, 60-cycle, alternating-current feeders. Disconnect switches are installed in the alternating-current buses between adjacent groups so that an interchange can be cut onto any line, or any line can be killed. Under ordinary operating all incoming lines are paralleled. No protection against surges is provided from group to group, but the inverse-power relay on each line prevents the feeding back of energy into any short-circuit from the bus.

Protection is afforded the incoming alternating-current lines by inverse-power relays. These are essentially three single-phase watt-meters having each a rotating disk which tends to rotate against stops when the current is in the right direction. When any re-

versal of current takes place the disk rotates in the opposite direction and closes contact through a relay which opens the alternating-current oil switch. This gives protection to the cables between the substation and the lines of the generating company, a better protection than would be provided by the ordinary overload relay. The latter, in case of a short-circuit, would allow a very heavy current to build up before the overload relays would operate. The reverse power relay operates instantaneously with the reversal of power.

The outgoing feeder cables leave the substation through a tunnel extending underneath the street to terminal poles on both sides. The cables are extended



MOUNTING OF FEEDER CABLES IN SUBSTATION BASEMENT AND SUBWAY

up through iron pipes from the tunnel to the overhead line. For this purpose 1,000,000-circ. mil rubber-covered cable is used and a fiber duct is placed inside the pipe. The magnetic induction in the iron pipe serves as a choke coil and in five years' experience with this type of connection with the overhead line the company has not lost a single meter.

On the overhead a General Electric lightning arrester is installed in each feeder before it enters the iron pipe. Across each rotary terminal an aluminum cell arrester is connected also. Finally, between each bus and the ground is a multi-gap arrester, two being provided for each bus.

UNUSUALLY COMPLETE METERING EQUIPMENT WAS PROVIDED

The alternating-current line panels are equipped with plugs for cutting in test meters (potential and current) in order to make it convenient to check the board meters against the standard. This is necessary because the company is buying power and consequently requires that the meters be tested frequently.

A Thomson watt-hour meter is placed on the direct-current side of each rotary and, inasmuch as the machines are put on or taken off the line to follow the load curve very closely and thus keep the rotaries loaded to full capacity so that they are operating at best efficiency, the meters are also thus kept loaded at practically full capacity and good meter efficiency is obtained. In other words, the machine and its meter are either on the line and carrying a good load or they are off the line entirely.

A special switchboard was provided in the substation



DIRECT-CURRENT ENDS OF ROTARY CONVERTERS AND FRONT OF MAIN CONTROL SWITCHBOARD



for measuring the return currents in a negative drainage system installed to drain the underground structures of other utility companies. A direct line was run from the nearest manhole of each utility company to connect with the switchboard. Here the circuit passes through a meter and is connected through a switch to the main negative bus. The size of the cable used depends upon the nature of the utility company's structure.

After the station was put into commission and tests had been made, in the neighborhood, of the drop between the utility company's structures and the railway company's track, a suitable resistance was calculated and a resistor was installed in the manhole. The circuit was calculated so that the utility company's system could be drained a sufficient amount to prevent deterioration and to keep that system negative to the railway company's structure, or at as low a negative potential as necessary. This plan makes it possible to determine the condition on each drain system at any time, the meters being labelled so as to indicate the name of the company whose structure is being protected.

A test is also provided on the semi-insulated return circuits which extend out to the several parts of the track system from the substation. It sometimes happens that the track department in doing construction work cuts these drain feeders and neglects to connect them up again so that there is no way of indicating whether the feeder is functioning or not. By installing a single ammeter with a selective switch, which will connect this meter with the shunt in the circuit of any of the return feeders, it has been made possible to test out periodically to see that all of the feeders are actually connected and doing the work for which they were installed.

The substation which has been described in this article replaces the old Cedar Avenue power house which was probably the largest non-condensing direct-current plant in the country. This plant was operated non-

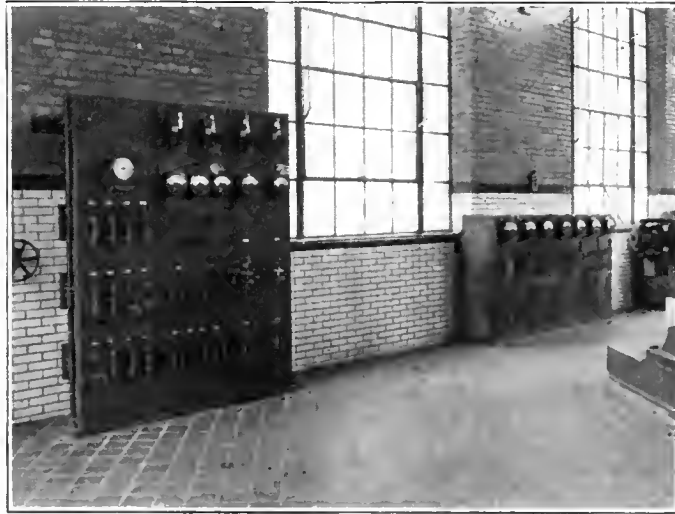
condensing because the exhaust steam was sold to a salt company adjacent at a price which made it very difficult for the central station companies in Cleveland to compete with the railway company's old power house on cost per kilowatt-hour output. When the question of the rehabilitation of the plant came up the railway company discussed with the central station companies

the question of a rate for power which if possible should be better than the cost of producing it in the old station rehabilitated to modern form in many essentials. Readers of the *ELECTRIC RAILWAY JOURNAL* will remember the extended investigations of the subject before the conclusion to purchase the power from the Cleveland Illuminating Company was reached. The situation was clearly outlined in an article appearing in the Jan. 6, 1917, issue of this paper, page 49. It was only by agreeing to set aside a certain amount each year to

amortize the investment in the plant that the conclusion to abandon the old plant was reached.

In the testimony presented at the hearings the reproduction value of the Cedar Avenue power house was placed at \$1,265,565, and this, less the salvage of machinery and equipment estimated at \$115,565, was to be placed in a suspense account and paid off at the rate of \$20,000 a month. According to estimates which were presented by the engineers at the hearing on this matter, the cost of energy under the contract with the Illuminating Company will be less than 6 mills per kilowatt-hour. The cost of energy production in the old plant was said to have been about 1 cent per kilowatt-hour.

As stated at the outset, Mr. Crecelius is a firm believer in the necessity for close watching of the apparatus in service to insure that no more will be in use than is necessary. To this end he has the operators keep graphical logs of the load and the capacity of machines in operation. Thus they are impelled to operate their stations at high efficiency.



SPECIAL SWITCHBOARDS IN CEDAR AVENUE SUBSTATION—AT RIGHT AMMETER BOARD FOR USE IN MEASURING DRAINAGE TABLES. AT LEFT HOUSE-SERVICE BOARD

## An Old Fable Modernized By THOMAS DREIER

**I** WAS THINKING the other day about big business institutions that attempt to influence public opinion by paying money to editors and newspaper men, instead of coming out frankly in the open and telling their story to the public over their own signature, either in advertisements or direct-by-mail printed matter.

Business men who indulge in that foolish pastime

should read that famous old fable which tells about a man, torn by the bite of a savage dog, who threw a piece of bread dipped in his blood to the offender, saying that he had heard it was a remedy for the wound.

"Then," said Æsop, "don't do this before many dogs, lest they devour us alive when they know that such is the reward of biting us."



# Why the Automatic Substation Saves Materials and Labor

The Author Analyzes the Advantages and Disadvantages of Automatic Substations and Mentions Some of the Details of a Type of Equipment Which Has Recently Been Developed

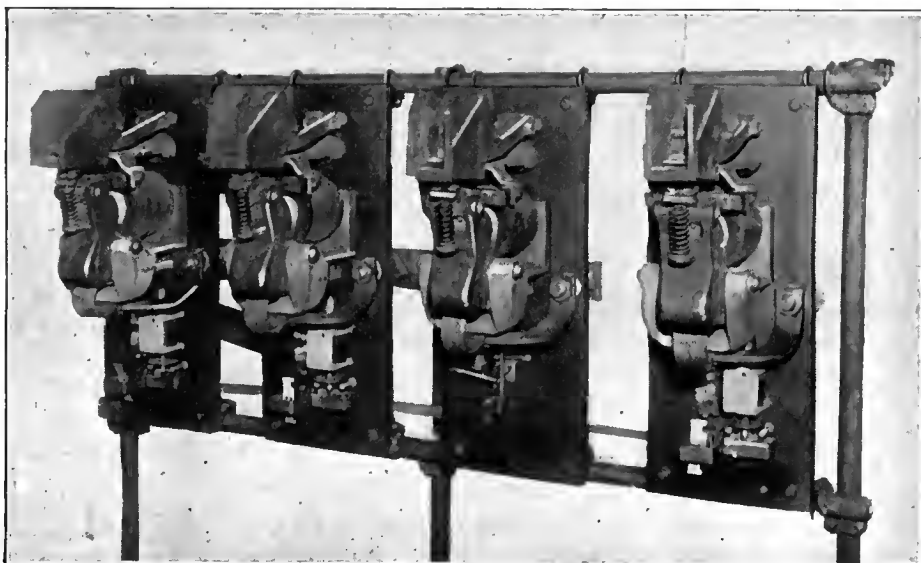
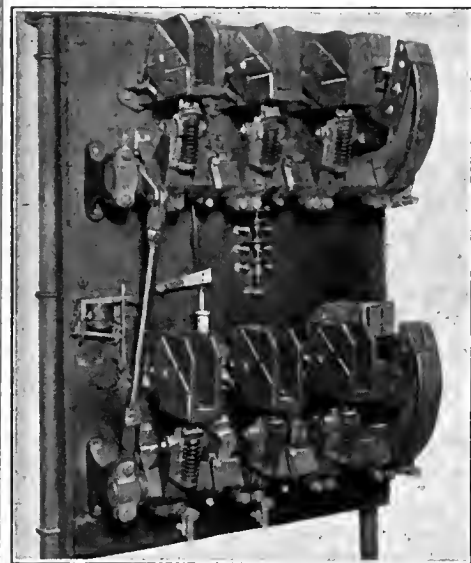
BY CHARLES F. LLOYD

Manager Substation Section Power Department, Westinghouse Electric & Manufacturing Company

THE automatic railway substation may be defined as one in which the functions of starting and putting the machines on the line, when there is a demand for power, and later shutting them down when the demand for power is not in evidence, are performed automatically. All of the switching operations are carried out in the proper sequence without the assistance of an operator. Obviously the converting apparatus must be protected from every conceivable

with the present shortage in labor and general labor unrest the reduction in necessary labor in the substations is a feature to which full consideration must be given even though it may be difficult to assign a monetary value to it.

Reduction in energy consumption, especially on inter-urban lines, will amount to a considerable item due to the elimination of no-load losses. The automatic switching shuts down the substation when power is



STARTING PANEL FOR AUTOMATIC SUBSTATIONS, AND DIRECT-CURRENT CONTRACTOR PANEL FORMING PART OF AUTOMATIC CONTROL

abnormal condition, even though such conditions may be expected to arise only infrequently.

Upon first thought automatic control seems to afford only a means of reducing labor charges, but it has been demonstrated that there are many other and important advantages to be derived from its use.

In general the principal advantages to be derived from the use of automatic substations are reduction in operating labor charges, reduction in labor difficulties, saving of energy, saving in feeder copper and reduction in the stray current from the railway return.

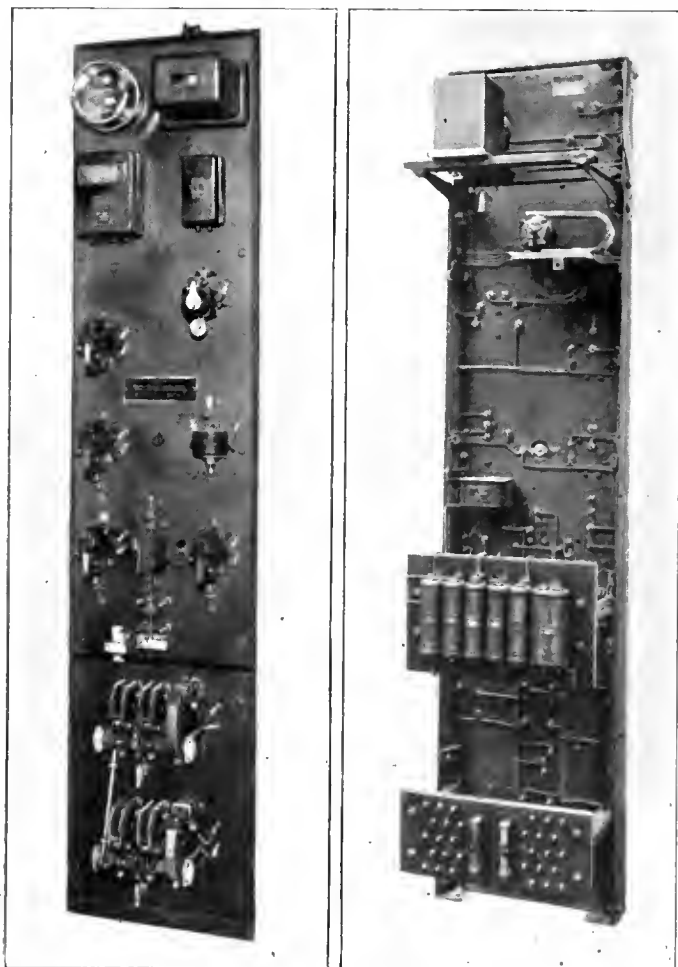
In the matter of labor the saving becomes important especially where three operating shifts are required under manual operation and where a number of substations are made automatic. In estimating the saving, however, error should not be made through the assumption that all operators can be eliminated. The automatic switching equipment as well as the other substation apparatus must be well maintained. Furthermore,

not required, thereby eliminating these losses which constitute a large proportion of the total in synchronous converter outfits.

Feeder copper can usually be reduced, or voltage conditions improved, by the use of automatic control. This follows from the possibility of relocating substations or increasing their number, or both, as no consideration need be given to expense for operators. There are no doubt many locations to-day where sufficient copper could be taken down practically to pay for the automatic switching equipment. Not only can copper be saved overhead but the return circuit is improved due to the reduced length of return circuits and the reduction in return voltage drops.

The features which have been enumerated are in the credit column of the balance sheet. Necessarily there are some items which must appear on the debit side. The first of these is the cost of the automatic switching equipment. Interest, depreciation or obsolescence,

and maintenance must be figured. In making old substations automatic practically all of the switching equipment must be discarded. Another item is the substation buildings required in excess of those used for non-automatic equipments. These constitute an additional capital charge, and interest, depreciation, maintenance, etc., must be allowed. It is true, however, that substation buildings for automatic equipment can be built very cheaply, as no provision need be made for the comfort of the operator. It is necessary only to provide a building that will protect the equipment from the weather, provide suitable ventilation and be large enough to give suitable clearances around the apparatus.



FRONT AND REAR VIEWS OF AUTOMATIC SUBSTATION RELAY PANEL

Obviously even if we grant that the statements already made are correct as to the value of attendantless substations, the validity of these arguments must be based upon the reliability of the automatic switching apparatus. The switching must be done by the use of apparatus which has proved its reliability in actual service.

With this idea in mind the Westinghouse Electric & Manufacturing Company has developed an equipment which is illustrated in the accompanying photographs. The apparatus shown is that required to control a self-starting synchronous converter outfit having one feeder only. The illustrations show all of the equipment with the exception of the bank of direct-current resistance grids controlled by the main direct-current contactor panel. It is understood, of course, that an electrically-operated alternating-current circuit

breaker forms a part of the equipment, to eliminate transformer losses when the substation is inactive.

Where more than one feeder is required, feeder panels are supplied with suitable contactors similar to those shown and with a suitable resistance bank.

Two of the illustrations show the relay panel, front and rear views respectively, which carries the greater part of the relays for insuring proper operation of the switching contactors. The starting panel illustrated is similar to the familiar starting panel for hand-operated outfits. A direct-current contactor panel replaces the usual direct-current panel used in switching non-automatically.

The same scheme of switching is used regardless of the capacity of the converting apparatus, it being only necessary to change the main current-carrying contactors to correspond to the different ratings.

The operating features of this equipment can be briefly summarized as follows: In the first place it duplicates in every way the manual operation of substation apparatus, and each switching operation is a direct function of the electrical condition of the converting apparatus at that particular moment. Further, each switching operation is dependant upon the proper functioning of the preceding operations. At no time is any switching operation dependant upon any mechanical time element or mechanical sequence of operation.

The time elements used with the various relays are especially designed to be unaffected by wide variations in temperature, none of them being of the oil dashpot type. Most of the magnet switches and relays which are used have demonstrated their quality in steel-mill control work, where they have given evidence of ruggedness and reliability.

As stated earlier the matter of protection even under very unusual conditions is a prime consideration in this type of equipment. In the present design, should trouble develop between the high tension of the transformers and the direct-current limiting resistance, alternating-current overload relays will trip the alternating-current high-tension breaker. To provide against the occurrence of low voltage a relay is installed to prevent the substation from starting should the alternating-current voltage be too low or should it drop below a predetermined value. Under the control of this relay the low-voltage coil on the alternating-current circuit breaker will shut down the substation.

To protect the station against direct-current overloads various sections of current-limiting resistance are inserted in the machine circuit by suitable contactors when the load exceeds the setting of the overload trip on the contactors. These contactors close, cutting out the resistance when the currents fall below their settings. Protection against overheat is provided through thermostats placed in the machine bearings and in each resistance section. These operate to trip the alternating-current circuit breaker. If for any possible reason the converter and the direct-current line should be of opposite polarity the direct-current line contactor will not close due to the action of a suitable relay. If current is still demanded from the substation it will immediately restart. Similarly the equipment is protected against reverse current by means of a reverse-current relay. Finally protection against over-speed is furnished through the usual speed-limit device.

# Automatic Substation of New Type on Ohio Electric

Details Are Given of a New Type of Equipment in Which Contactor Switches Controlled by Relays Are Employed to Start and Stop Rotary Converters in Attendantless Substations

By R. J. WENSLEY

Switchboard Engineering Division, Westinghouse Electric & Manufacturing Company

THE Ohio Electric Railway has recently installed in its 500-kw. substation at Columbus Grove, Ohio, an automatic control of a type developed by the Westinghouse Electric & Manufacturing Company. This is shown in Fig. 1. The single unit in this substation is fed through transformers from a 33,000-volt transmission system. The switchboard is of the usual type having three panels, one for the alternating-current starting switch, one for the main direct-current switch and circuit breaker, and one for two outgoing feeders. The automatic equipment was installed without disturbing the existing board, all connections being paralleled with the old equipment.

A simplified schematic diagram of connections is given in Fig. 2, showing the control connections with only enough of the main circuits to provide a clear understanding of the sequence of operations. The alternating-current control circuit is fed from a transformer connected to the high-tension line ahead of the circuit breaker.

The contacts of the contact-making voltmeter 1 which governs the starting of the station, close when the trolley voltage falls below the point at which the station is to be started. In practice this will usually be at from 60 to 80 per cent of the normal trolley potential. The contacts of 1 complete a circuit through the operating coil of potential relay 2. This is an induction-type voltage relay which will not close its contacts unless the alternating potential is sufficiently high to insure the starting of the converter and the satisfactory operation of the various switches.

Contacts of 2 complete a circuit through timing relay 7 and in turn through the operating coil of master relay switch 3. This switch energizes the operating bus auxiliary A, from which all the various switch operating circuits are supplied. When this bus is energized three switches are closed at once: (a) The closing coil of the circuit breaker; (b) the field switch 5 which connects the shunt field across the converter brushes; and (c) the relay switch 4, which in turn closes starting switch 6, thereby applying starting potential to the converter slip rings. Interlock contacts operated by 6 connect the field and armature circuits of polarized motor relay 7, to the trolley and to the converter brushes respectively. These circuits are not shown on the diagram.

The polarized motor consists of a small shunt motor with a permanent magnetic field circuit on which is added a shunt coil energized from the trolley during the starting operation. The permanent magnet provides

against the contingency of the station having to start when the trolley is not energized. The armature is connected across the converter commutator brushes during starting. When the converter is first connected across the starting taps, this applies an alternating potential across the relay armature which causes it to oscillate only. As the converter approaches synchronism, the frequency decreases until when it locks into step, a unidirectional potential is applied across the relay armature causing it to revolve in a clockwise di-

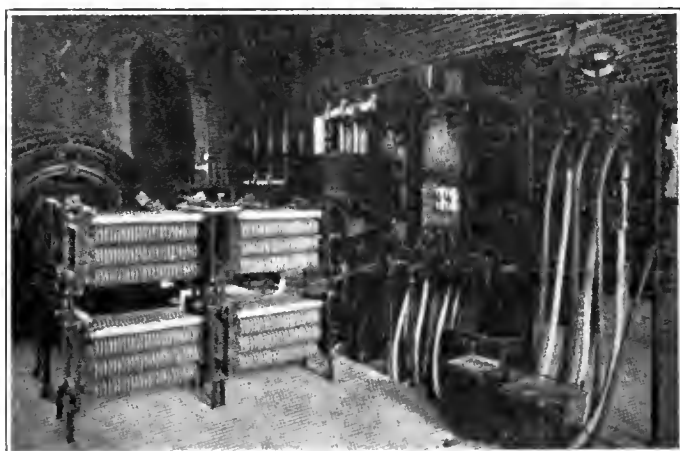


FIG. 1—AUTOMATIC SUBSTATION OF OHIO ELECTRIC RAILWAY, COLUMBUS GROVE, OHIO

rection, if the polarity is correct. A reducing gear is built into the motor frame which drives a revolving brush inside the molded contact block below the relay base. This revolving brush and its four contacts are shown as 7 in Fig. 2. Assuming that the polarity is incorrect, the brush will pass contact A, thereby closing relay 8 which will lock itself closed through its own contacts. The brush will next pass contact D, thus closing a circuit from the negative converter brush (which is permanently grounded) through one of the contacts of 8, through the coils of relays 9 and 32, and thence to the positive converter brush. Relay 9 is provided with a holding contact which connects its coil directly across the converter, thus causing it to remain in after the brush has passed point D of 7.

The contacts of 9 cause field switch 5 to open and field switch 10 to close. Switch 10 connects the shunt field across the converter brushes in the reverse direction, which causes the converter potential to die away nearly to zero. This causes 7 to slow down and stop somewhere near C; it also allows the armature of 9 to be released, which in turn causes the field switches 5 and 10 to

resume their original positions. This will normally cause the converter to slip a pole and build up in the reverse direction.

If the converter fails to reverse its polarity, the polarized motor will start again in the same direction, causing the field to be reversed again and will continue to do so until correct polarity is obtained or field reversal limiting relay 32 operates. Relay 32 guards against the times when, for some reason, the converter refuses to be reversed by the field. It is a step-by-step device, which after a predetermined number of trials will open the starting switch and allow the converter to drop out of step. After a few seconds it will allow the starting switch to close again and possibly catch the converter in such a manner as to bring it up in the correct direction. This sequence of operations closely imitates

effected. On the other hand, the transfer cannot be made until the converter is definitely locked into step and with the right polarity. While the description of the operation takes a relatively long time, the actual operation is carried out in a very brief interval. With a 300-kw., 25-cycle, 750-r.p.m. converter, starting on 28 per cent taps, the first direct-current line switch was closed ten seconds after the starting impulse was received; except that when field reversal was necessary, an additional four seconds was required. A 500-kw., 500-r.p.m. machine took four seconds longer. When commutating-pole machines are used an additional time of approximately five seconds is required to allow the brushes to be lowered.

The interlock on running switch 11 completes a circuit through the contacts of safety relay 31 to the closing coil of the main direct-current line switch 12. The coil of 31 is connected across the contacts of 12 and is calibrated to operate at 750 volts. As the normally negative converter brush is grounded, there will be a potential of 1200 volts across the coil of 31, if by any accident the converter should reach this stage of the operation with inverted polarity. If 31 operates it will open the circuit-breaker of 12, while at the same time tripping the circuit breaker and causing the station to start over again.

Switch 12 connects the converter to the line through the current-limiting resistance, thus preventing the sudden surge frequently caused in manually-operated substations when the switch is first closed. Switches 14, 15 and 16 are then successively closed through current-limit relays which prevent the short-circuiting of the resistance if the load exceeds their setting. These relays also serve as overload

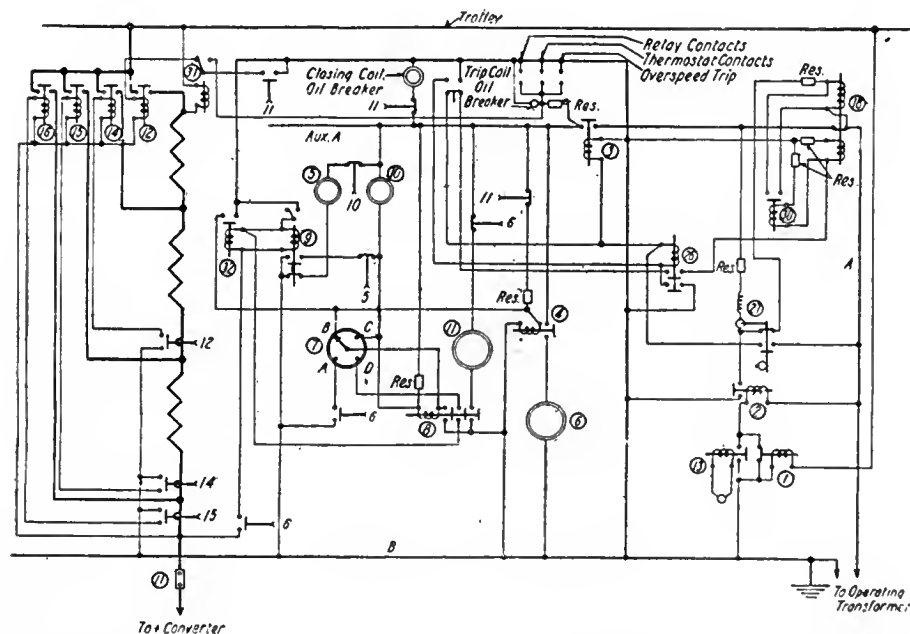


FIG. 2—SIMPLIFIED CONNECTION DIAGRAM FOR AUTOMATIC SUBSTATION

All switches are shown for de-energized condition of switch operating coils: 1—contact-making voltmeter. 2—Low voltage relay. 3—Alternating-current shunt relay. 4—Alternating-current shunt relay. 5—Shunt field switch. 6—Starting switch. 7—Polarized motor relay. 8—Alternating current shunt relay. 9—Field reversing relay. 10—Shunt field reversing switch. 11—Running switch. 12—Line switch. 13—Holding relay. 14, 15 and 16—Line resistance switches. 17—Ammeter shunt. 18—Reset relay. 26—Alternating-current shunt relay. 27—Torque-motor operated time delay relay. 30—Resetting lockout relay. 31—Over-voltage safety relay. 32—Field reversal-limiting relay.

the method used in the ordinary hand-operated station for securing correct polarity, except that it is much more likely to secure the desired result at the first trial because the field reversal is obtained at exactly the proper time in every case, which is not true when the human element is introduced.

The contact on 9 short-circuits the coil of 8 and causes it to open when the field is first reversed. As the converter builds up in the right direction, relay 7 begins to revolve in a clockwise direction. As that brush passes *D*, no circuit is set up because 8 is open. In passing *A*, 8 is again closed. When the brush reaches *B* the coil of 4 is short-circuited, thus causing starting switch 6 to be opened. A circuit through an interlock on 6 and through the main contacts of 8 closes running switch 11, thus applying full running potential to the converter rings.

It will be seen that with this system it is not necessary to wait even a short time after reaching synchronism before the transfer to running potential is

made; in case of overload or short-circuit on the direct-current system.

As soon as 12 is closed and the converter is supplying current to the line, the load relay 13 operates. This relay closes its contacts at approximately 15 per cent of the normal station load or any other value that may be found necessary on the individual application. The contacts of 13 are in parallel with those of 1 and serve to keep the station in operation as long as the demand justifies.

The motor-operated time relay 27 holds the station on the line during periods of coasting or when the cars are stopped to receive or discharge passengers. It can be set for any period (from three to eighteen minutes) that may be found desirable after installation. This relay will open switch 3 if no demand in excess of the setting of 13 is made on the station within the time setting.

Thermostats are provided over the current-limiting resistance grids to cut the station out of service if an overload or short-circuit continues sufficiently long to



overheat them. The station will continue to come back into service indefinitely after overheating of the grids if the demand is present.

Thermostats are also provided for the bearings but after these once operate the station is cut out of service until inspected. The bearing thermostat consists of a copper bulb inserted in the bearing and located so that one side of the bulb is in contact with the bearing metal. The bulb is connected to an external metallic bellows and is filled with a volatile fluid which vaporizes at the maximum desirable bearing temperature, thus expanding the bellows and operating a contact that disconnects the converter from the line. After the bearing has cooled, all that is necessary to reset the thermostat is to press down on the contact rod, thus opening the contacts and restoring the device to its original condition.

An auxiliary switch on the circuit breaker, together with relay 26, resetting relay 18, and repeating lock-out device 30 is arranged to cause one or more attempts to start after the station has been tripped by the alternating-current overload relays. This is to take care of restarting after a plain overload of sufficient magnitude to affect the alternating-current relays or a short-circuit due to a flashover or some other self-clearing source of trouble. If the tripping still persists, relay 18 is electrically locked open by 30, which is a step-by-step device capable of being set to perform from one to four operations.

An extra device can be connected to 18 that will signal the dispatcher over the telephone line that the station has been locked out due to trouble. This will also indicate the number of the station when there are more than one on the line. When this scheme of control is to be applied to converters having interpoles, which this one has not, it is necessary to provide a brush lifting and lowering device. This is arranged with limit switches and interlocks so that the converter cannot be connected to the starting taps unless the brushes are lifted, nor can the direct-current line switch be closed until the brushes are fully lowered. The brushes are arranged to raise immediately after the station is shut down, if the alternating current service has not been interrupted. If the shut down is caused by failure of the source of supply, then the brushes will be raised when the supply is restored. The lowering operation occurs when the low-tension running contactor closes, taking place in the sequence of operations between the closing of this switch and the closing of the direct-current line switch 12.

## Public Utility Situation Improving

The public utility situation, according to the Chicago *Tribune*, is gradually turning for the better. A compilation of the annual report of ninety-three of the principal corporations for the year ended Dec. 31, shows aggregate net earnings of \$207,761,420 as compared with \$192,761,420 for the previous year. The improvement in the aggregate, according to this paper, is largely due to the fact that state and municipal boards having the power of rate regulation have adopted a new policy toward the utilities and recognized the fact that the welfare of the nation at war depends in a large measure on the good credit and operating efficiency of public utilities.

## Safety Reminder Used at Columbus

THE Columbus Railway, Light & Power Company has been very active in campaigns to reduce accidents. Some of this work was described by H. W. Clapp, general superintendent, in the issue of the ELECTRIC RAILWAY JOURNAL for Sept. 8, 1917, page 395.

## Accident Prevention Record

### YEAR 1917

In the four principal classes of accidents occurring in connection with operation of street cars, our record for the year 1917, as compared with 1916, is as follows:

1. Boarding moving cars . . . . . 26.5\* decrease.
2. Leaving moving cars . . . . . 50.3\* decrease.
3. Collisions—cars and wagons . . . 3.5\* decrease.
4. Collisions—cars and automobiles 47.0\* increase.

There were 36\* more automobiles in operation on the streets on December 31, 1917, than on the same date of 1916.

To the untiring efforts of conductors and motormen and the co-operation of car riders, may be ascribed the remarkable results obtained in the first two classes of accidents. Collisions between cars and automobiles have increased rapidly. Our records show the increase is due to the carelessness of automobile drivers. The accidents can be reduced in number if drivers will cease taking reckless chances and use more judgment in handling their machines.

The Columbus Railway, Power & Light Company

ACCIDENT POSTER RECENTLY ISSUED BY C. RY., L. & P. COMPANY, COLUMBUS, OHIO

One of the latest features in the safety movement was the printing of a large poster giving the results of an analysis of accident reduction, or the reverse, for the year 1917. The poster, which tells its own story, is reproduced herewith.

## Car With Raised Motors for Service in Flooded Streets

The Brooklyn (N. Y.) Rapid Transit System has added navigation to its already broad field of transportation service. This comes in the nature of a car with the motor built above the floor and which is used to operate through flooded streets.

At one point in particular in Brooklyn, the houses along both sides of the street are built at a much higher elevation than the street and whenever there is a heavy rain or a melt from a heavy fall of snow, the drainage is so inadequate that the street becomes a veritable canal. As the result of melting snow such a flood recently reached a maximum depth of 3 ft. and the deep-sea transport car known as the "Canarsie Ferry" was pressed into service, carrying passengers across the deep to safety on the dry land on either side of the young flood.

Before the "Canarsie Ferry" was built for ocean voyages this line has several times been compelled to discontinue operation for periods of twenty to thirty-six hours.



## Six-Cent Fare Turned Down

### Rhode Island House Votes in Favor of Adopting Zone System Recommended by Special Investigators

A ZONE system of fares for the Rhode Island Company, Providence, R. I., system was adopted by the House on April 10 by a vote of 49 to 43. Action by the Senate has not yet been taken. The present situation is, therefore, that the General Assembly has half repudiated the report of a committee of legislators favoring a 6-cent fare. This constitutes an overruling of previous action, when the House blocked the installation of a zone system recommended by special investigators.

#### ACTION TAKEN BY HOUSE

The vote taken by the House was on a bill reading in part as follows:

"The Public Utilities Commission is hereby directed to order the Rhode Island Company to make such modifications in its system of fares and transfers as the special investigating commission has so determined and certified [in its zone system recommendations]. Such modifications shall be subject to change from time to time by the Public Utilities Commission whenever in its opinion the public interest shall so demand and the affairs of the Rhode Island Company shall warrant.

"New schedules shall become effective on or before May 1, 1918, upon at least five days' notice to the Public Utilities Commission and the public, provided that the Public Utilities Commission may, for cause shown by the Rhode Island Company, extend the date upon which such new schedules shall become effective.

"The schedules of rates of fare and transfer regulations herein ratified and confirmed shall continue in force during the remainder of the war with the Imperial German Government and for a further period of one year after a treaty of peace shall have been signed by the warring nations, unless sooner abrogated or changed by the Public Utilities Commission in accordance with law."

It will be recalled that the Rhode Island Legislature in January, 1917, passed a bill providing for the appointment of a special investigating commission to inquire into the advisability of granting financial relief to the Rhode Island Company. This commission reported in March, 1918, in favor of the adoption of a zone system of fares, as described in the *ELECTRIC RAILWAY JOURNAL* of March 23. The Legislature, however, blocked this method of relief by passing a special bill ordering the Public Service Commission not to put the recommendation into effect, as the previous bill had provided, and appointing a special committee of legislators to look into the affairs of the company and to consider the report of the special commission.

#### LEGISLATIVE COMMITTEE WANTED HIGHER UNIT FARE

This committee of legislators held numerous meetings and finally reported back to the Legislature, on April 3, in favor of a 6-cent fare. Tickets were provided at the rate of eighteen for \$1. It was proposed that the increase should go into operation on May 1, and continue until one year after the signing of a treaty of peace.

The committee stated that if further temporary relief were needed, it could be obtained by a reduction of the franchise tax and the paving charges paid to the city of Providence.

#### SPECIAL COMMISSION DID ITS DUTY

In discussing the recommendations of the special investigating commission, the legislative committee said in its report that the former body fully met its duty of determining whether or not the company was securing a fair return on the property used in the public service. While there might be a difference of opinion in regard to the value as fixed by experts of the commission and also as to the means recommended for securing increased revenue, there could be no question that the commission had rendered a valuable service to the State by the comprehensive work shown in the report. The legislators believed that the information would be most pertinent and helpful in the consideration of the question of revising the fares to conform with a fair return. In their opinion, however, such a question must give way for the present to one more pressing—the problem of finding funds sufficient to enable the system to keep in operation.

The legislators noted that according to the report of the investigating commission the rentals, interest, taxes and operating expenses of the company exceeded its income by \$512,849 for the calendar year, 1917. The comptroller of the company stated to them that during January and February of 1918 the company had run behind \$182,000, and one of the trustees said that a fair estimate of the deficit during 1918 would be from \$700,000 to \$750,000. Public utilities throughout the country, the committee said, are facing similar problems, and public authorities are granting relief in the form of increased rates. It was believed, therefore, that a similar attitude on the part of the authorities of Rhode Island was warranted by the conditions.

#### WHY A SIX-CENT FARE WAS FAVORED

The legislative committee tried to learn what additional revenue would result from the operation of a zone system or a 6-cent fare, but it found that in each case this was largely a matter of opinion. The estimate of increased revenue obtainable from the 6-cent fare ranged from \$440,000 to \$500,000; and from the proposed zone system, from \$400,000 to \$550,000.

In recommending a 6-cent fare instead of a zone system to supersede the present 5-cent rate, the legislators stated their reasons as follows:

1. The increase to 6 cents has been the mode of relief granted during the last few months in most of the places where fares have been increased.
2. It does not appear that the zone system as proposed by the special investigating commission has been applied to any other community, at least not to any of the size of Providence and its suburbs.
3. The 6-cent fare is simpler in operation and easier to carry into effect as a measure of temporary relief and it will not result in a disturbance of community life or of property and rental values.
4. The increased fare is required because of war conditions and constitutes a burden that should be shared by all patrons.

# Business Men Can Help Win the War

**Patriotic Addresses at Convention of United States Chamber of Commerce Urge Co-operation in War-Financing, Transportation, Shipbuilding and Maximum Production—Utilities Must Be Preserved and Expanded**

**F**OUR questions of supreme importance to the nation as a whole and to the American business world formed the nucleus around which the sixth annual convention of the Chamber of Commerce of the United States, held on April 9-12 in Chicago, Ill., centered. These were government organization in relation to business in war, transportation, war financing and ship building. It was said that business men can do much to assure a speedy victory, a solution of the labor problem, and the preservation and the expansion of utilities and other essential industries. During the entire convention, which was well attended, patriotic enthusiasm was so expressed as to leave no doubt of the unselfish and devoted loyalty of business.

## MAXIMUM PRODUCTION MUST BE ASSURED

The meetings began informally on Tuesday afternoon with the presentation of several committee reports. In one of these the committee on industrial relations set forth the progress that is being made toward a plan for assuring maximum production. The committee pointed out that the difficulties of obtaining war materials have been increased by questions of wages, hours and conditions of labor, transportation for workers, and housing, each of them of the highest importance to the maintenance of vital production. The constructive plans suggested by the committee include agreements that there shall be no cessation of production, that these agreements shall be supported and enforced by executive authority, that there shall be control of causes leading to unrest, and that there shall be provision for conclusive arbitral decisions regarding differences that arise in spite of preventive measures.

The formal sessions began Wednesday morning with an address of welcome by Lucius Teter, president of the Chicago Association of Commerce. After reports of the board of directors and the National Council, the Chamber's activities in relation to government organization, shipping and finance were described in brief addresses by Waddill Catchings, Edward A. Filene and Wallace D. Simmons, chairmen of the respective war committees. A ringing challenge to American business men that they bestir themselves to speed the structure of ships was the keynote of Mr. Filene's remarks. He emphasized the responsibility that rests upon the community and the individual business man, and said:

## HELP SPEED THE BUILDING OF SHIPS

"First, we can see to it that our local business organizations in every community where ships or ship parts are being turned out shall make it their first business to organize themselves into an effective aid to shipbuilding. Second, we can help organize the community behind the shipbuilding in as definite a manner as we can organize the business forces back of shipbuilding."

At the Wednesday afternoon session R. Goodwyn Rhett, president of the National Chamber of Commerce, gave his presidential address. He developed the idea

that the great growth of this country and of its resources has been due in large part to the energy, the enterprise and the genius of the American business men, and that further development depends on the continued idealism of business men. In Mr. Rhett's opinion the Chamber of Commerce has a wonderful mission in putting a soul into business.

Mr. Rhett also made a plea for co-operation. He explained that under the original interpretation of the Sherman Law, two manufacturers engaged in the same line of work feared to act in unison, although actual consolidations were not forbidden. This led to the organization of trusts. The decisions in the Standard Oil and American Tobacco cases reversed this idea, and undoubtedly were of great help to business. Manufacturers now may co-operate and should do so, for the benefit of not only themselves, but also the public. The war is teaching this country the necessity of co-operation and stronger fellowship among all classes.

On Wednesday evening the auditorium was filled to capacity for addresses by Josephus Daniels, Secretary of the Navy, and Franklin K. Lane, Secretary of the Interior. Secretary Daniels devoted the major portion of his speech to a recital of the achievements of the American Navy in convoying troops to France and in patrolling the seas in conjunction with the fleets of the Allies. He said that ships are vitally necessary in winning the war and urged business men to give up skilled mechanics so that the ship-building program can be carried through without delay. Secretary Lane, in a very patriotic speech, outlined a scheme of caring for the returning armies of the United States when the war is over. He said that the government could let each man have 40 acres of irrigated land in Colorado, house and stock, payment being made in labor by constructing the works which would make this possible.

## ADDRESSES OF INTEREST TO ELECTRIC RAILWAYS

Four sessions were held simultaneously on Thursday, the first devoted to government organization in relation to business in war, the second to finance, the third to railroads and highway transportation, and the fourth to shipping. Among the addresses of special interest to electric railway men were ones by Thomas N. McCarter, president Public Service Corporation of New Jersey, Newark, N. J.; Alba B. Johnson, president Baldwin Locomotive Works; Roy D. Chapin, president Hudson Motor Car Company and chairman highway transportation committee of the Council of National Defense; Charles A. Eaton, head of national service department of Emergency Fleet Corporation; Francis H. Sisson, vice-president Guaranty Trust Company, New York, and P. H. Gadsden, president Charleston Consolidated Railway and Lighting Company, Charleston, S. C. Mr. Gadsden's paper was presented in his absence. This and the address by Mr. McCarter are abstracted on following pages.

Mr. Johnson discussed the problem of motive power under the United States Railroad Administration. He first described briefly the development of the steam locomotive. Standardization in its designs has been an ideal much talked of, but never realized, because standardization implies the crystallization of present practice as the practice of the future. Many attempts have been made to fix standards for particular railroads and groups of roads, but in every instance these have given way to the urgency of keeping pace with other roads. Those most rigidly adhering to their standards have lagged behind their competitors. Railroad men are now convinced that the most advantageous field of standardization is with the details rather than the complete locomotive or car as a unit. The result in standardization attained by the Railway Master Mechanics' Association and the Master Carbuilders' Association may be said to have been as great as it was humanly possible to achieve under the diversity of management, the diversity of ideas and the necessity of constantly keeping abreast of the march of improvements.

#### MOTIVE POWER IS NOW INADEQUATE

The participation of the United States in the World War, Mr. Johnson said, has brought about new conditions, as all the railroads are now subject to a unity of management and of control in their purchases. Under the instructions of the Director General a committee comprising eleven railway officials, collaborating with representatives of the three principal locomotive builders, have now agreed upon twelve standard specifications for the essential elements of locomotives, leaving a certain freedom in regard to accessories. These standards, however, are only proposed, and there are good arguments against any effort for their general adoption at this time.

Mr. Johnson then discussed railway electrification, for which he saw an extensive future, although the introduction of the electric locomotive must be gradual because of the cost of installation. The motive power of the country is admittedly inadequate for the service demanded under the present war conditions. Railroads have been unable since 1907, because of low earnings, to enlarge greatly their facilities. Adequate provision of motive power, like adequate provision of other rolling stock and other facilities, can only be assured when Congress places upon the functionary charged with the duty of regulating rates, the definite responsibility of making such rates as will yield earnings sufficient for thorough maintenance, adequate improvements and the attraction of necessary capital.

#### SERVICE IS MORE IMPORTANT THAN RATES

Mr. Sisson said in part: "The scepter in the railroad world has passed out of the hands of the railroads' executives and the bankers who financed them. The American people control the situation through their political representatives, and they will determine the whole course of the future. They will suffer or prosper, in accordance with the wisdom shown.

"No class of people will exercise so powerful an influence in reaching this decision as the shippers. The rates at which service is rendered are incidental to having service prompt and adequate. To serve their own ends in the future, shippers must take a con-

structive attitude toward the transportation question."

Mr. Chapin said that the resolution recently passed by the Council of National Defense approved the widest possible use of the motor truck as a transportation agency. He requested the State Councils of Defense and other state authorities to take all necessary steps to facilitate such transportation. A special plea was made for co-operation with the "Return Loads Bureau," by which motor trucks used over freight transportation routes would have loads in both directions. The Connecticut State Council of Defense, in co-operation with the National Committee, has established fourteen such bureaus in different cities in that State. They are listed in the telephone book, and no charge is made for their service. Similar action was urged on Chambers of Commerce elsewhere. Mr. Chapin spoke about the difficulty experienced by trucks last winter with the snow on country roads and said that several states made a record in clearing off this snow so that there might be no interruption in the army schedule of truck movements.

Mr. Eaton discussed the subject of "Patriotic Labor." In speaking of shipbuilding he said that the management in these enterprises had undergone a nervous strain without parallel. On one side they have had the government demanding, in the name of the people, results, and on the other they have been confronted with the most difficult and dangerous labor conditions. It is a physical impossibility to build ships with all equipment, and the equipment demand for anything approaching an adequate supply of ships could not have been filled, under war conditions, in less time than it has taken to bring the shipping interests to their present point.

According to Mr. Eaton the working men in the shipyards are paid more money than ever was received by this class of labor for similar work before, although this itself has constituted a danger and an embarrassment. The only solution is to have an agreement enacted into law so that the National Administration shall have capital and labor pledged to complete service and sacrifice until the war is won. This will eliminate profiteering of capital and profiteering of labor.

#### RESOLUTION FOR AID TO ELECTRIC RAILWAYS

Questions submitted by members of the Chamber of Commerce for consideration at the convention included a resolution by the American Electric Railway Association asking for rate relief. The resolution, which was to be voted upon Friday morning, is as follows:

*Whereas* the maintenance of the country's public utilities in the highest possible state of efficiency is essential not only to the war program of the United States but also to the nation's business and industrial interests; and

*Whereas* such efficiency depends upon the preservation of the credit of the companies providing public utility service; and

*Whereas* the increase of costs and the unusually onerous conditions of operation brought about by the war seriously threaten the ability of the public utilities to continue the furnishing of the necessary services they perform; and

*Whereas* the protection of the credit of public utilities is very largely in the hands of regulatory commissions and other public authorities, rather than in the utilities themselves: Now, therefore, be it

*Resolved*, That the Chamber of Commerce of the United States of America recommends to state and local authorities that they recognize the unusual and onerous conditions with which public utilities are contending, and that in the interest of the nation, of business and of the public they give prompt and sympathetic hearing to the petitions of such utilities for assistance and relief.

## Immediate Relief Is a Prime National Necessity

**Capacity of Utilities for Service Must Be Greatly Increased—Public Sense of Justice Toward Companies Must Be Developed**

BY THOMAS N. MCCARTER

President Public Service Corporation of New Jersey, Newark, N. J.

IT HAS REQUIRED the conditions that have been brought about by the war to demonstrate to the nation that the public utilities of the country are national in their scope. The fact that they operate in relatively small units is an unimportant incident. Their ability as a whole to perform their chief function—that of providing adequate service—is of vital consequence to the comfort and economic welfare of the nation. If this great industry, viewed as a whole—however it may operate—be unable to perform its proper functions by reason of political or economic oppression or otherwise, a paralysis will spread over the business life of the country in fully as fatal a manner as would result from the collapse of the railroad industry.

### UTILITIES MUST BE PRESERVED AND SPEEDED UP

If this country is ultimately to take its place in the forefront of the Allies and be the final decisive factor in the termination of the world war, as we all believe, not only must the integrity of the utility industry of this country be preserved, but its activities must be speeded up to a point never hitherto attained. Its capacity for service must be greatly increased, and the capital necessary to accomplish this result must be provided. The gas companies, as well as the by-product coke companies of the country, must be placed in a position where they can produce all the trinitrotoluol that the government requires for its high explosives. The power companies must keep pace with the extraordinary demands being made upon them to furnish power in large quantities to the shipyards, to the aeroplane factories and to the innumerable industries engaged exclusively in the manufacture either of war products or of materials which ultimately become a part of war products.

The electric railways, in addition to the performance of their usual every-day service, must be enabled to extend their lines to the war camps, the shipyards, the aeroplane factories, the shell-filling plants and all other similar government enterprises, and to equip the new lines, as well as their existing lines, with sufficient cars, copper, power and crews to transport daily the multitudes of workers, running in the aggregate into many hundreds of thousands, suddenly superimposed in many localities upon an already existing over-congested business.

That the solidity and integrity of this great enterprise is essential to the successful carrying on of the war, by the government, has been distinctly recognized by the administration. It was made the subject of vigorous comment by the Comptroller of the Currency in his last annual report. More recently, it has been the subject matter of correspondence between the Secretary of the Treasury and the President, which has been made public and in which both of these distinguished officials take pronounced ground to the above effect.

Like those of every other industry in the country,

utility costs over pre-war conditions have enormously increased. It is susceptible of proof that their labor and material costs have increased by an average of 70 per cent. What is the truth in the experience of every individual and of every industry is true of them, in many instances in more accentuated form.

Unlike the ordinary private industry, however, they have not been able to "pass the buck" of increased costs to the consumer. The rates of charges of these companies have remained fixed, being, like those of the railroads, subject to regulation, differing only from the railroads in this respect: that the railroads have been primarily controlled on this question by one national power, the Interstate Commerce Commission, whereas the utilities are, for the most part, governed by their respective state commissions and in many cases by municipal authorities as well. The Interstate Commerce Commission, being located at Washington, may be expected to absorb quickly the spirit of the national necessity in the premises; but its control of the situation has been much impaired by the taking over of the railroads by the government.

The President, the Secretary of the Treasury and the Comptroller of the Currency, by their published statements above referred to, have done much to bring home to the various state regulatory bodies the necessity for prompt action to avert impending disaster. It is difficult, however, to overcome the deep-seated prejudices of the public, which are too often reflected in the decisions of state and local commissions.

### PUBLIC SPIRIT OF FAIRNESS NEEDS DEVELOPMENT

There is now a country-wide movement under way by the utilities for increased revenue. In many cases the state commissions are facing the issue courageously and granting the necessary increases. If wide-spread disaster is to be averted, however, a public spirit of fairness and justice to these companies must be developed that will quickly manifest itself in the decisions of the commissions. The public must realize that in the economics of this business, as in every other business, two and two make four and not two or three, and it must be willing to pay as fair a price for 1000 cu. ft. of gas, a kilowatt-hour of electricity or a ride upon an electric car, as it freely pays for a pound of butter or a new pair of shoes. There is nothing peculiar about the utility business that excepts it from the inexorable laws of trade.

In the development of such a public spirit I can think of no influence which can be so effective as that radiating from the great body of business men composing the United States Chamber of Commerce. The opportunity of assisting the rightful solution of this problem is a patriotic service and one of tangible assistance in the prosecution of the war.

The government has lent its aid to this problem in another substantial manner. It has passed the war finance corporation act, which will undoubtedly afford many of these companies, either directly or indirectly, a channel of finance that would not have existed if the act had not been passed. Congress, fearful lest further inflation might ensue as a result of such legislation, has provided in the act more rigid requirements as to percentages of collateral and the like than I think were



necessary or desirable under existing conditions, but we must do the best we can with the tools at our command.

The one great and controlling factor is this: the revenues of these companies must be increased to an extent that will provide net earnings sufficient to enable them to finance their maturities and to attract the new capital it may be necessary for them to obtain to meet war needs—whether that money is to be advanced by individuals, by banking corporations or by the government itself. No financial agency, individual, corporate or governmental, can be expected to make improvident loans or investments.

#### CLOSER CO-OPERATION WITH PUBLIC IN FUTURE

When the proper time arrives and we have opportunity for the deliberate consideration of such problems, I look forward to the working out of a plan that will involve closer co-operation in the future between the public and these companies in their dealings each with the other. It will be a plan that will retain the manifest advantages of the private operation of these enterprises, subject of course to public supervision; a plan that will insure a fair return to capital already invested; a plan that will offer to the public, more or less generally, an opportunity from time to time to invest in these enterprises the capital needed for their development upon an assured basis of an adequate return; a plan that will provide an absolutely safe investment for the masses in suitable allotments.

Such a thought is not Utopian. It is practical of accomplishment and should result in the minimizing of the everlasting friction that hitherto has existed between the public and these companies. It should insure for the future the proper development and the logical expansion of their facilities to meet the reasonable requirements of the public.

## Helping To Win the War

### Shipbuilding Has Increased Railway Problems— Communities Should Aid in Distributing Traffic More Evenly

By P. H. GADSDEN

President Charleston Consolidated Railway & Lighting Company, Charleston, S. C.

**W**HAT can local business organizations or enterprises do to help provide adequate transportation facilities for shipbuilding employees? The most important thing—that which will bring the best returns—is to foster a feeling of co-operation toward the local electric railway. This includes a willingness to be put to inconvenience—less frequent service if need be—and a realization that the management is desirous of doing its best in the face of many problems.

To get electric railway service up to the highest standard obtainable in normal times may be practically impossible in the present emergency. It may be questioned whether the necessary man-power, if it were possible to pay wages high enough to attract men from other lines, could, in the interests of the government, be diverted from present or prospective occupations.

Perhaps the partial solution of this problem lies in the employment of women as conductors. There are arguments against adopting this plan, but the benefits

may outweigh the objections. The practice has become quite general in England and France, and in some instances in this country. As a whole, it seems to be working fairly well.

#### SHIPBUILDING HAS INCREASED RAILWAY PROBLEMS

Obviously, the problems are vastly increased when there is added to the pre-war demand upon the electric railway the duty of transporting thousands of newcomers to and from the shipyards, in rush hours, practically all of them going in one direction at one time. This creates a condition which calls for the patriotic assistance and forbearance of every loyal member of the community. Without transportation facilities the shipbuilding plants cannot be kept going, as their character makes it necessary that most of them be situated in localities which do not permit employees to live within convenient walking distance from their work.

The electric railways are confronted with the need of providing extra equipment which will be used only an hour or two daily and extra employees whose services are required for the shipyard trips only. Some companies may be able without aid to provide the necessary men and facilities to transport these men, but most of them—and I think all of them—will require government assistance.

It may not be necessary, in order to transport shipbuilding employees to and from the plants, for the companies to resort to such extreme measures as using the equipment and the men that are required in regular schedules. If such a move becomes necessary, however, it is only urging the performance of a patriotic duty to ask that everybody co-operate, even at the cost of slight personal inconvenience.

#### PUBLIC CAN HELP TO DISTRIBUTE TRAFFIC

Communities can aid the electric railways by helping to bring about a more even distribution of traffic and consequent improvement of service. As the industrial plants must have more men than ever and from present indications it would be impossible for the railways to carry them all practically at one time, it would seem that the problem would have to be solved by some readjustment of the working hours, so that the men would not all start and stop work at the same time. This can be accomplished by a staggering of hours of employment in factories and large department stores. It would be helpful if the women whose duties do not require them to travel during the rush hours would shop earlier in the day.

Further relief that can be obtained without serious inconvenience to anyone can be had through the adoption of the skip-stop. This plan has been investigated by the War Board, and bulletins have been issued recommending it to all electric railways. This system has been in effect in Cleveland for a long time, and it has recently been put into operation on all lines of the Public Service Railway and in Toledo, Detroit, Cincinnati, Buffalo, Denver, Kansas City and Baltimore. It has also been recommended for early adoption in Washington, D. C. Immense saving can be made in coal if communities will co-operate with the companies to permit this plan and others just as desirable to be put into effect.



My recommendations may be set forth in the following order:

1. Communities should deal with the street-car problem with a spirit of co-operation and helpfulness. This includes consideration of an increase in the price of the commodity which the company produces, namely, transportation.

2. Electric railways which are not provided with equipment and other facilities to handle properly present and prospective traffic should make every effort to secure such equipment and facilities as far as practicable at the earliest possible date.

3. Electric railways should put into effect everything that can be done to bring about improved efficiency and the conservation of material and man-power.

4. The attention of the officials of industrial and governmental plants should be attracted to the necessity of full co-operation by staggering the hours of employees, so that the same number of cars and men can be used for several trips, instead of only one.

5. Attention of members of department stores and other commercial establishments should be called to this matter in the hope that they will adopt such means as may be most efficient in their efforts to induce their patrons to co-operate in the movement to secure a more even distribution of traffic by advocating that women do their shopping in the morning and early hours of the afternoon. The newspapers of the State should join in the movement in order that the greatest publicity might be attained.

6. The hearty co-operation of the authorities in the various municipalities in the State should be given to the movement, and Boards of Trade and Chambers of Commerce should give their assistance.

7. The skip-stop method of operation should be adopted.

8. The communities should forego during the period of the war new pavements or repavements and other improvements which would require expenditures by electric railways.

### Keeping in Touch with the Boys at the Front

EMPLOYEES of the General Electric Company in the Chicago district have perfected an organization for the welfare of the men in this district who have gone into the service. The work is under the direction of a committee consisting of a chairman, a secretary, a treasurer and the heads of departments. A "service news letter" is sent to all men in service twice a month. Tobacco, candy and magazines are sent out at frequent intervals, and the women employees have prepared more than 200 knitted articles for the comfort of the soldiers. The funds for this work are obtained by monthly contributions pledged by the employees of the district. The company has seventy-five men in the service from this district.

During the year 1917 the Arkansas Valley Railway, Light & Power Company, operating more than 35 miles of railway lines in the vicinity of Pueblo, Col., gained 1095 hp. of lighting business and 3957 hp. of power business, making a total gain for the year of 9 per cent of the total load served at the beginning of the year. It is reported that prospects for new business during 1918 are excellent.

## AMERICAN ASSOCIATION NEWS

### War Board Holds Busy Session

AT THE MEETING of the American Electric Railway War Board held at Washington on April 5 all of the members were present, and in addition J. K. Choate, E. C. Faber, W. V. Hill, E. B. Burritt and H. C. Clark.

Chairman T. N. McCarter reported that as a result of a letter from Clarence Renshaw, of the Fuel Administration, to the New Jersey Fuel Administrator, arrangements had been made to inaugurate the skip-stop plan on one division of the Public Service Railway on April 1 and on the remaining divisions on May 1. Mr. McCarter also explained the plan of the current meeting of the Chamber of Commerce of the United States and of his own address prepared for that meeting. (An abstract of the address appears elsewhere in this issue.) He reported progress in the work of the advisory committee appointed as a result of a conference of utility men held at the Engineers' Club on March 22.

The War Board discussed the purchase by the government of equipment to be loaned to the electric railway lines. Mr. Budd suggested that the matter of the handling of government passenger business by electric lines be taken up with the Director General of Railroads for adjustment.

Mr. Gadsden made a progress report on the activities of the joint committee of public utilities. Arrangements have been made to push the work actively early in April, the state and regional committee organization being now complete. Mr. Gadsden had asked for a meeting of the advisory committee at an early date.

A large part of the War Board meeting was taken up with a discussion of the War Finance Corporation, the shortage in platform labor, the relation of the electric railways to transportation by motor trucks, and House Bill HR-10265, which authorizes the Secretary of Labor to acquire local transportation lines which may be necessary in war preparations. On the second topic the hope was expressed that arrangements can be made to secure the loan of men from shipyards served by electric railways to do platform work in rush hours.

The statement was made that the War Board will move its headquarters about July 1 to the new District National Bank Building on G Street. The board adjourned to meet again on May 3.

### The Largest Section Organized in the Smallest State

IN ACCORDANCE with the program announced in earlier issues of the ELECTRIC RAILWAY JOURNAL, on April 9 the employees of the Rhode Island Company, Providence, R. I., organized Company Section No. 12 of the American Association. The number of charter members was just 200, the largest number of charter members in the sections formed to date.

A number of visitors from out of town were present to explain to the men the possibilities of company section work as demonstrated elsewhere. E. B. Burritt, New York City, told of the way in which the associa-

tion is trying to help the government and presented a framed charter to the section. H. C. Clark, New York City, showed how the section work acts to develop latent talent in the members. H. H. Norris, *ELECTRIC RAILWAY JOURNAL*, emphasized the importance of high ideals of transportation service, particularly in war times. Martin Schreiber, Newark, N. J., chairman of the committee on company sections, used as the basis of his talk the "Company Section Hand," of which the thumb represents loyalty, and the fingers enthusiasm, efficiency, team work and public relations (see *ELECTRIC RAILWAY JOURNAL*, May 26, 1917, page 961). Cyrus Ching, Boston, Mass., spoke along patriotic lines and urged his hearers to make the most of their opportunities for service. Theodore Francis Green, secretary and director of the Rhode Island Company, related his experiences at the Rhode Island meeting of the Connecticut Company section held last month, the most important lesson being that through the company section the employees of the company become acquainted in a way otherwise impracticable.

The closing and principal address of the evening was by Charles C. Pierce, Boston, Mass., who pictured vividly the present condition of the electric railway and analyzed the situation for the purpose of pointing out the reasons for the present difficulties. He said that while fares in the pre-electrification days were much higher than at present, when horse railways were electrified the railway managers voluntarily adopted the 5-cent fare because they felt assured of ability to give the required short-haul service at a profit for this figure. Natural development, however, has partly robbed the electric railway of this business so that it is very illogical to try to meet present requirements under ancient specifications. After showing how the uniform 5-cent fare had acted to improve living conditions by building up the suburbs, Mr. Pierce said that theoretically at least the zone system is the best solution of the fare problem and this country may ultimately come to it in practice.

The organization meeting was presided over by Charles E. Redfern, claim agent of the company. The election of officers and directors resulted as follows: President, Mr. Redfern; first vice-president, A. L. Campbell; second vice-president, F. L. Caswell; secretary, E. J. Cooney; treasurer, G. A. Worrall, assistant secretary, C. R. Ballou; company representative, A. E. Potter; directors, W. D. Wright, R. R. Anderson, A. V. Gardner, A. E. Paddock, H. W. Sanborn and W. C. Slade. Mr. Cooney was appointed chairman of the program committee and he selected the following to assist him: J. A. Lockhart, G. B. Merchant, J. A. Hackett and B. T. Raymond.

### Traction Company Completes Transmission Line

A 33,000-volt transmission line from Fort Smith, Ark., to serve Alma and other communities has been completed and these towns will now receive electrical energy from the Fort Smith Light & Traction Company. With the completion of the line now under construction from Alma to Ozark, the Fort Smith Company, which also operates approximately 33 miles of electric railways, will meet all the electrical requirements for a

distance of 45 miles west and south of Fort Smith. The railway receipts of this company for January and February are reported to have been 22 per cent greater than for the same months of last year. General business conditions in the city are exceptionally good, due to the many new industries now in operation.

## LETTER TO THE EDITOR

### Calibration of Switchboard Watt-Hour Meters

BROOKLYN RAPID TRANSIT COMPANY

BROOKLYN, N. Y., April 10, 1918.

To the Editors:

In my article "The Testing Organization of Electric Railways," which appeared in the March 16 issue of the *ELECTRIC RAILWAY JOURNAL*, I stated under the caption "Calibration of Ammeter and Other Shunts," page 515, that where mercury-type watt-hour meters are used, and charges between one company and another are based on the meter registration, the resistances of the watt-hour meter shunts ought to be measured *in situ*. Quite obviously the argument was one applying to shunt-type watt-hour meters, whether mercury meters or meters of any other form, and that the article put it otherwise must be ascribed to the lack of use of precise language.

The argument itself is open to criticism. Accuracy of measurement of energy output of direct-current circuits of very large power is difficult to insure because whatever kind of watt-hour meter is used, whether of the series type or the shunt type, the ultimate foundation for accuracy of calibration must rest on some measurement of a shunt resistance, and such measurement should be made on the shunt *in situ*. This, although somewhat difficult, is undoubtedly capable of accomplishment with high accuracy. The point I wish to make clear is that a shunt-type watt-hour meter does not suffer under any disadvantage in this respect compared with a series type. Either reliance is to be placed on the accuracy of the manufacturer's calibration of both types having been maintained, or the accuracy of the completed installation has to be established in terms of working standards. To do this latter involves ultimately a measurement of resistance of some fairly large shunt, because no measurement of thousands of amperes is practical except as it produces potential drop across some known resistance.

It is true that shunt-type watt-hour meters, while having the advantage of ease of calibration as low-current instruments apart from their shunts, yet have the offsetting disadvantage of necessitating the alignment of measurements so made to obtain assurance that the resistance of the shunt watt-hour meter and its leads has the nominal ohmic resistance called for. Otherwise accuracy of registration is not assured even though the meter may have been given correct adjustment by the easy means of low-current calibration, and the watt-hour-meter shunt may be known to have its nominal resistance. This point, however, was in nowise touched upon in the article.

HARTLEY LEH. SMITH,  
Chief of Testing Bureau.

# Progress of the Headway Recorder

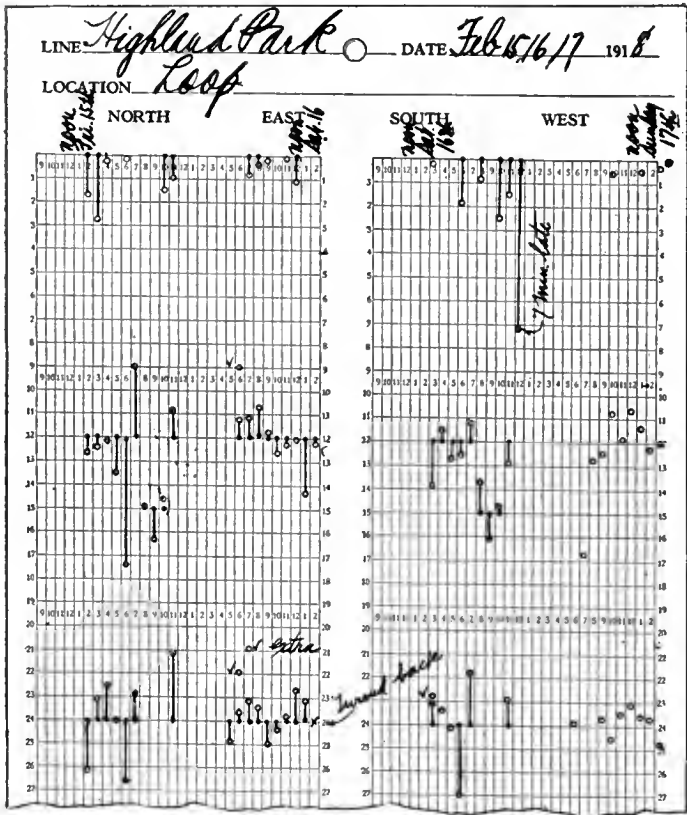
Accuracy in Recording Car Movements Enables Operator to Determine Weak Spots in Service and Checks Up Car Crews

THE rapid progress of the one-man car, especially in towns with single-track service, has given a still wider usefulness to the headway recorder of the Nachod Signal Company, Louisville, Ky. Considerable experience with this recorder has led to improvements which have made it possible to produce a clock mechanism that will run with high accuracy to drive a fast-moving record sheet through a wide range of temperature and weather conditions. This adjustment to provide for large changes in temperature is cared for by a compensated balance wheel. A micrometer screw adjust-

too long at a point and running at high speed to get on schedule again, which not only invites accidents, but wears out both rolling stock and track, and wastes power; a motorman running ahead of schedule, an act sometimes dangerous and one that irritates regular patrons; and a car crew "dragging" the car at peak load in order to obtain more fares than usual; but turning in only the usual amount.

The recorder is also valuable: In enforcing a slow order, by making a graphic record of the time consumed between the two points; for presenting definite evidence showing car delays at a railroad crossing; in cultivating the good-will of the public, by making an absolutely incontrovertible record showing the regularity of the service; in enabling the work of a careful motorman to count, and, in general, improving the morale of the crews; finally, for general schedule studies, as traffic counts, waiting at meeting points, etc.

The instrument is inclosed in a cast-iron box at-



HEADWAY RECORD					
LINE		DATE			
LOCATION					
RUN NO.	DUE AT RECORDER	ARRIVED AT RECORDER	MINUTES LATE	MINUTES EARLY	REMARKS (FROM MOTORMAN'S REPORT)
Friday Feb 15 P.M.					
	4:36	4:30		6	
	6:12	6:17	5		
	11:24	11:21		3	
	11:48	11:52	4		
Sat. Feb 16 P.M.					
	5:48	5:45	3		
	12:36	12:39	3		P.M.
	1:48	1:51	3		
	4:36	4:31		5	
	6:24	6:27	3		
	12:08	12:07		7	A.M. Sun. 17
Sunday Feb 17 A.M.					
	12:36	12:40	4		

AT LEFT, PART OF HEADWAY RECORDER RECORD WITH COMMENTS; AT RIGHT, INTERPRETATION IN FIGURES

ment on the regulator also permits regulation to a nicety in the shortest time. A stop works prevents over-winding and breaking of the spring; while the use of a zig-zag feed prolongs the useful life of the ribbon since its whole width becomes available.

The Nachod automatic headway recorder gives a daily history of car movements at a given point, enabling the operator to find the weak spots in his service, whether they are due to causes within or without his control. Accuracy in making time points is indispensable to a high standard of service; and the recorder gives its results with an accuracy not possible by human means, and without any favoritism. Like any other checking device, the full value of the headway recorder can be obtained only by enthusiastic follow-up and intelligent analyses.

The recorder will show such operations as: A motorman reversing his car without proceeding all the way to the end of a single-track line; car crews lying over

tached to the pole at a point where the record is to be taken, at which point a Nachod trolley contactor is placed on the trolley wire and connected to the recorder.

Every car passing under this contactor prints a mark on a moving paper record showing the exact time of its passage. The record sheet is about 8 in. x 17 in. in size, the ruling divided into halves for movements both ways for one day, thirty hours being ruled. The time of any mark is given by its position both in the vertical hour ruling and in the horizontal minute ruling, the chart forming virtually a clock dial of unusual kind. If, for instance, the schedule is every fifteen minutes, the cars on time will make a straight line across the record, at the hour, fifteen, thirty and forty-five minute line; and any marks scattered away from this line show the irregularities of the schedule in a most graphic manner. On the back of the record is a form for noting these irregularities and the reason

## New-Type Cars for Melbourne Suburban Electrification

Equipment Includes 400 Four-Motor Cars and 400 Trailers—Will Operate in Two to Six-Car Trains Over 300-Mile System

**A**N ABSTRACT of a report by Charles Merz, consulting engineer, to the Victorian Railway Commission on the electrification of the suburban steam railways of Melbourne, was published in the Oct. 3, 1908, issue of the *ELECTRIC RAILWAY JOURNAL*. Mr. Merz at that time recommended the direct-current system for the conversion of some 300 miles of track. The later development of the high-tension direct-current system and the single-phase system called for further investigation, and according to an article appearing in the Dec. 7, 1912, issue of the *JOURNAL* estimates showed that the direct-current system would be less expensive both in first cost and in operation.

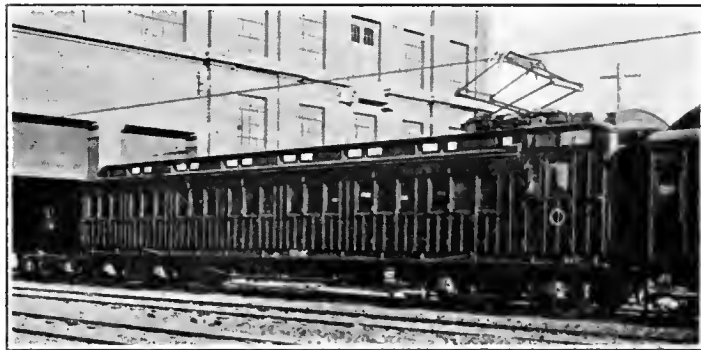
The Feb. 8, 1913, issue of the *JOURNAL* announced the award of the contract for this electrification to the

station is located at Newport, from which point current will be transmitted to substations located at various points on the line and delivered to the overhead contact system at 1500 volts.

The accompanying photographs\* show the new cars which have been designed to operate in conjunction with this electrification. They are equipped with roller pantograph collectors and will be operated in trains of from two to six cars, an equal proportion of motor coaches and trailers.

All trains on the system wherever possible will follow a regular schedule throughout the day and rush-hour traffic will be provided for by increasing the lengths of the trains, though it is not proposed to have trains of more than six coaches to begin with. The schedule speed including stops will be 21 m.p.h.

The suburban traffic amounted to 70,000,000 passengers in 1908, and when the contract for the system was awarded it was estimated that the lines would carry 150,000,000 passengers by 1917. For this reason all parts of the electrification scheme were designed to be capable of extension.



SWING DOOR AND SLIDING DOOR TYPES OF CARS FOR MELBURNE SUBURBAN ELECTRIFICATION

General Electric Company. This contract specified that the work should be carried out on a 1500-volt direct-current system. The contract comprised 400 motor-car equipments, consisting of four motors each, 800 control equipments, 400 of which were for trail cars, and 400 air-compressor equipments. This was said at the time to be the largest single order ever placed for electric railway apparatus.

The mileage of the suburban steam lines included in this scheme was made up of 150 route-miles or 289 track-miles of running road and 34 miles of sidings. The electrification has now been in progress for some years and is nearing completion. The main generating

The 1600 motors for the 400 motor coaches are of the GE-237 type provided with commutating poles and rated at 140 hp. each at 725 volts. They will be operated two in series on 1500 volts. These motors are self-ventilating by centrifugal fans cast integral with the pinion-end armature-core head.

The motors are arranged for tap-field control and are geared so as to have a running speed of 52 m.p.h. over a level track on express runs. The control equipments are of the Sprague-General Electric Type M form with relay automatic control.

\*Reproduced with permission of C. F. Dewey, Victoria Railways, Sydney, N. S. W.

(Concluded from page 717)

therefor. The scale is very open or fast moving, a minute requiring  $\frac{1}{4}$  in. on the chart. The record is given in a compact form convenient for filing, obviating a large amount of clerical work. The recorder does not identify the particular car that made the record, but this information is obtained from the run number, or predetermined succession of cars.

Within the cast-iron box is a switchboard and the recorder itself, which is removable as a unit. The latter consists of a record-bearing drum, driven by a Seth Thomas clock movement, jeweled and compensated for temperature. The drum is revolved once an hour and is fed axially  $\frac{1}{10}$  in. per revolution. The printing

bar, operated by a magnet armature, prints the mark through an endless band of typewriter ribbon feeding on the backward stroke. Two pairs of magnets are used, one for each direction of car movement. A perforation in the blank record slips over a locating pin on the drum, while the edges of the record are further aligned by shrouded ends of the drum. The attention required is winding the clock daily, putting on a new record and removing the old. To expedite this, the case is provided with a door switch to throw on a light when the door is open.

The contactor, through which the printing magnet received current as the car passes it, is easily installed and requires no maintenance.



# News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

## Service-at-Cost Proposal

**Minneapolis Street Railway President Urges Settlement of Franchise Matter Up Since 1915**

Horace Lowry, president of the Minneapolis (Minn.) Street Railway, has addressed a communication to the street railway matters and extensions committee of the City Council, indicating that the company desires the early conclusion of a cost-of-service franchise agreement.

Under date of June 8, 1915, the company addressed a letter to the City Council stating that the Minneapolis Street Railway desired to enter into negotiations with the city of Minneapolis with regard to the extension of its franchise. It was hoped that the outcome of such negotiations would result in an agreement with the city which would put the company on a firm enough financial footing to attract the additional capital required for its development.

Since the sending of the letter the committee took up the matters mentioned and proceeded with negotiations preliminary to an agreement of this kind. This work has been done slowly and carefully in order that there could be the most free discussion of all points, but during the last year events unforeseen when the original negotiations were entered into have developed and changed the aspect of things by creating an emergency which calls for speedy action. On this point the company says:

### HIGHER FARES PREDICTED

"Because of the constantly increasing cost of essential materials and supplies and the constant decrease in our earnings during the last nine months, our ability to continue the standard of service set up in the past and to pay our employees reasonable wages will depend upon our entering into a cost-of-service agreement with the city. We realize that your committee is entirely familiar with this general situation in our business, but desire to submit the attached communication from John Skelton Williams, Comptroller of the Currency, to the Congress of the United States, to show the national necessity for maintaining our local public services at maximum efficiency and to indicate that the new conditions confronting electric railway companies and other public utility companies are entirely beyond the control of the management of such companies.

"The Minneapolis Street Railway has no desire to create any undue alarm, but wishes to direct your attention to the gravity of this situation. Whether

a cost-of-service agreement should now be considered or whether for the present the service should be curtailed which is least needed and which could, therefore, be modified with the least inconvenience to the traveling public is a question which the company believes is now of utmost importance to the city. Six other cities in the United States of similar size have met this situation by increasing their rates of fare. Forty-four smaller cities have done likewise, and sixty-one other cities have negotiations under way with the same purpose in view.

"We ask that your committee give this company the earliest possible opportunity to discuss the matter with you, and we believe that such discussion should be carried on with free and unprejudiced minds on the part of all concerned and that the program arising out of such discussion should be tested only by the question as to whether it is for the benefit of the average citizen."

Mr. Lowry's letter was considered by the committee at a special meeting. A tentative draft of a cost-of-service franchise is ready for the consideration of the committee. It was prepared by Stiles P. Jones and City Attorney C. D. Gould. The question of fair valuation, however, still is to be determined in the face of reports from several engineers and minority and majority committees of the Central Franchise League. The valuations so fixed vary from \$15,000,000 to \$26,000,000.

## Municipal Railway Extension

Oliver T. Erickson, a member of the City Council of Seattle, Wash., has announced that he is having prepared for submission to the Council a bill authorizing the issuance of utility bonds and the adoption of a plan and system for the extension of the present municipal railway on Avalon Way, Thirty-fifth Avenue Southwest and Admiral Way, and other streets in West Seattle. In connection with this, a bill will be prepared providing for the issuance of utility bonds for an extension of the proposed elevated railway on Washington Street, from First Avenue South to Fourth Avenue South, and for condemnation proceedings for the right to proceed with such construction.

The plans above announced indicate that the Council will not act favorably on the application of the Puget Sound Traction, Light & Power Company for a grant on Avalon Way. That company recently advised the Council of Defense that work would begin on the line as soon as the City Council granted a franchise.

## President's Labor Appeal

**In Approving Appointments to National War Labor Board President Outlines Methods to Be Observed**

President Wilson on April 8 approved the appointments that had been made to the National War Labor Board by the Secretary of Labor in accordance with the recommendations contained in the report of the War Labor Conference Board dated March 29. The members of the board are William Howard Taft and Frank P. Walsh, representatives of the general public of the United States; Loyall A. Osborne, L. F. Loree, W. H. Van Dervoort, C. E. Michael and B. L. Worden, representatives of the employers of the United States; and Frank J. Hayes, William L. Hutcheson, William H. Johnston, Victor A. Olander and T. A. Rickert, representatives of the employees of the United States.

### START OF THE LABOR PROGRAM

In January the Secretary of Labor, upon the nomination of the president of the American Federation of Labor and the president of the National Industrial Conference Board, appointed a war labor conference board for the purpose of devising for the period of the war a method of labor adjustment which would be acceptable to employers and employees. This board made a report recommending the creation for the period of the war of a National War Labor Board with the same number of members as the War Labor Conference Board, to adjust labor disputes in the manner specified, and in accordance with certain conditions set forth in the report, referred to at length in the ELECTRIC RAILWAY JOURNAL for April 6, page 673.

### PROCLAMATION BY THE PRESIDENT

The President has now made proclamation of the following for the information and guidance of all concerned:

"The powers, functions, and duties of the National War Labor Board shall be: To settle by mediation and conciliation controversies arising between employers and workers in fields of production necessary for the effective conduct of the war, or in other fields of national activity, delays and obstructions in which might, in the opinion of the National Board, affect detrimentally such production; to provide, by direct appointment, or otherwise, for committees or boards to sit in various parts of the country where controversies arise and secure settlement by local mediation and conciliation, and to summon the parties to controversies for hearing and action by the National



## Long Strike on Interurban Railway Ended

First the Trainmen, Then the Engineers, of Kansas Road Go Out—Union Charter Revoked

The Joplin & Pittsburg Railway, operating in Southeastern Kansas and southwestern Missouri, was shut down by a strike of its employees from Feb. 12 to March 21, when the men returned to work under former conditions. W. D. Mahon, president of the Amalgamated Association of Street & Electric Railway Employees, was able to show the men that they had made a mistake. The local union had been suspended from the national body because of its action in breaking its contract with the railway company, but it was reinstated following the course it took in instructing the members to return to work. The engineers, who struck after the trainmen went out, returned at the same time as the trainmen. Service in full has now been restored. The strike in its various ramifications was so unusual that a brief review of some of the outstanding features of the disturbance would seem to be of general interest.

### REVIEW OF STRIKE

The company made a three-year contract with its trainmen in the fall of 1917, granting increased wages amounting to about 35 per cent. While the company dealt with the Amalgamated Association, it had an explicit understanding that the property was to be operated on the "open shop" basis. At that time the officers of the company talked over the situation confronting the company very frankly with the representatives of the union, and the men co-operated with the company shortly afterward in securing an increase in fare to 2 cents a mile. This increase helped to take care of the increase in wages and of other extra expenses.

*(Concluded from page 719)*

Board in event of failure to secure settlement by mediation and conciliation.

"The principles to be observed and the methods to be followed by the National Board in exercising such powers and functions and performing such duties shall be those specified in the said report of the War Labor Conference Board dated March 29, 1918.

"The National Board shall refuse to take cognizance of a controversy between employer and workers in any field of industrial or other activity where there is by agreement or federal law a means of settlement which has not been invoked.

"I urge upon all employers and employees within the United States the necessity of utilizing the means and methods thus provided for the adjustment of all industrial disputes, and request that during the pendency of mediation or arbitration through the said means and methods, there shall be no discontinuance of industrial operations which would result in curtailment of the production of war necessities."

On Feb. 12 the men voted to strike because of the company's refusal to grant a further increase in wages. The company had explained to the men that the contract fixed the wages for three years, and that the increase demanded would provide a larger wage schedule than the revenues of the company could stand. In support of its position with respect to its financial inability the company presented figures as to revenues provided by the State Utilities Commission. But the men went out and operation of the line was suspended.

Officers of the Amalgamated Association immediately went to Pittsburg. They pointed out that the men were violating their contract. The men, however, refused to heed the advice of the national union. That body thereupon suspended the charter of the local union. The company therefore had to seek employees from other sources. Under the agreement made with the amalgamated, the company was at liberty to employ such men as it could secure, the new employees to be at liberty to organize a local to be recognized and chartered by the Amalgamated Association.

In pursuance of this program the company on March 2 started its cars with new men. When the first car from Joplin to Pittsburg reached Pittsburg, the power plants and substation men went out, claiming that they as union men could not supply power for the operation of cars by non-union men. Incidentally it should be mentioned that the engineers had been kept at work on full pay from Feb. 12 so that the power would be available the moment the company was prepared to resume operation.

Officials of the railway company remonstrated with these men and on March 4 the engineers were all laid off. Since it was apparent the cars could not be operated until the engineers had shown willingness to supply power, there was no necessity for having the engineers around.

### FIRST THE TRAINMEN, THEN THE ENGINEERS

On March 11 the trainmen of the local union at Pittsburg voted to recede from their position and return to work under the conditions of their original contract. They were willing to abide by the instructions of the amalgamated. But they could not work unless there was power. On March 12, the day on which the trainmen were to return to work, the engineers, who now were in the position of having the original grounds for their "strike" removed automatically, made demands for increased wages and for payment for the time they had been idle since March 4. The demand for more pay would have been sufficient to prevent the company

from re-employing them, but the demand for pay while the men were idle could not be considered.

The engineers pointed out that watchmen were necessary at the power plant and contended that because of their priority they should have been retained to guard the plant while the stations were idle. In other words, these men refused to perform the duties for which they were employed, but they demanded that they be paid the salaries scheduled for such duties while performing minor duties for which other men were available who were willing to do the work for which the engineers were hired.

### COMPANY USES PUBLICITY

The railway company promptly took the public into its confidence, making clear the exact conditions under which the men quit work and those under which they were willing to resume work. The public was well aware, therefore, that the men violated a contract and that the engineers made illogical demands in their proposals with reference to returning to work.

## War Attitudes Stated

Indiana Commission Indicates Conditions That Will Govern Its Consideration of War Appeals

The general attitude of the Public Service Commission of Indiana with respect to granting relief to public service corporations affected for the time being by the extraordinary conditions imposed upon them by the war has been set forth by the commission in the case of the Greencastle Local Phoenix Telephone Company. In its ruling the commission said:

### COMPANIES MUST DO THEIR BIT

"These are war times and the commission has time and again emphasized the proposition that it would not guarantee normal dividends to utilities during the period of the war. The utility must bear its share of the war's burdens, just as every other person and institution must bear its share. Even if it were necessary for the officers of the company to forego a portion of the usual salaries which they are receiving in order to pay a portion of the increased costs of operation, this would be a much more equitable solution of the problem than an increase in the rates.

"The commission is not unheeding of the fact that much has been said recently as to the necessity of carrying our public utilities through the war period. The commission is keenly alive to the point thus emphasized by Secretary McAdoo, and has laid down the fundamental proposition that it will grant a full measure of relief whenever necessary to prevent injury to the business or interests of utilities. But certainly the statements above quoted are not to be interpreted as meaning that state and local authorities should, during the period of the war, guarantee to utilities the full or excessive profits of peace times.

"In several cases before the commission it has developed that utilities have built large and valuable properties out of earnings and that the profits in the years preceding the war were in excess of what would have been considered reasonable profits under the regulatory system. Now when war conditions have arisen and the large profits of the past have decreased, the utility will feel that it has just grounds for asking increased revenue. The commission, of course, cannot concur in such a conclusion."

## One Commission Proposed

Measure That Would Consolidate Two  
New York Regulating Bodies  
Passed by Senate

Senator Thompson's bill consolidating the two public service commissions of New York and generally revising the public service commission law was passed by the Senate on April 5 with just the required twenty votes.

It is the opinion of William L. Ransom, chief counsel of the commission for the first district, that the new bill would cause the city actually to "lose contact with and control over its public utility matters." Mr. Ransom says further:

"The Thompson bill ought to be entitled 'A measure to abolish the powers of the commissions, but leave all the offices in existence for salary purposes.' It is not too much to say that the act would place all complainants at a hopeless disadvantage and weaken the power of the commission to compel a corporation to do anything against its will."

### NO ECONOMY IN CONSOLIDATION

After analysis of the bill, the members of the commission with jurisdiction in New York City fail to find that the proposed organization would cost the State less than the present plan. Because of the insertion of a clause creating three additional commissioners to take care of transit matters, bringing the total number now at work, the argument for economy is not substantiated, it is thought.

None of the political reporters at the Capitol have so far cared to hazard a guess as to the possible fate of the measure when it comes up in the House.

## New Wage Scale in Spokane

A new wage scale has been put into effect by the Spokane & Inland Empire Railroad, Spokane, Wash. It fixes a maximum wage of 38 cents an hour after six years' service and provides a graduated wage scale for the period up to that time. A man commences at 31 cents an hour, is increased 1 cent an hour for the second six months, and after that 1 cent an hour for each year of service up to the time his sixth year commences, when he receives the maximum wage.

## Wage Question in New York City

Employees Referred by Public Service Commission to the City  
Administration for Relief

A committee of the Brotherhood of New York Railways Company Employees' Association called upon Oscar S. Straus, chairman of the Public Service Commission for the First District of New York, on April 9 and made an urgent plea for commission aid in behalf of an advance in wage to meet the increased cost of living occasioned by war conditions. T. M. Fazakerley, president of the brotherhood, speaking for the organization, said in part:

"On Sept. 3, 1916, the employees of the New York Railways entered into an agreement with the company, which embodied a scale of wages and working conditions for a period of two years. When the contracts were signed the wage scale was satisfactory to all, but our rates of pay have not increased with the cost of the necessities of life, although the railway has from time to time granted to the employees 'War Bonuses' to help us meet these conditions. We have lived up to our agreement with the company, but when the time comes for the signing of new contracts, unless some material increases over the present rates are granted, we shall consider ourselves free to seek more remunerative employment elsewhere."

"It must be apparent to you that the men are entitled to a living wage for the support of themselves and families. We feel that you should know the facts from our standpoint. We recognize that the company cannot give us more money unless its income is increased. We see no immediate prospect of any decrease in the cost of materials."

Chairman Straus told the committee that he was in accord with the efforts of the men to obtain an increase in wages commensurate with the advance in living expenses, but explained to them the limited jurisdiction of the commission over matters involving the wages of men employed by utility companies. In respect of an advance in fare to the New York Railways, the chairman set forth in detail the recent decision of the Court of Appeals in the Rochester fare case, holding that the commission has been correct in its view that, without the city's consent, the commission could not undertake to raise a rate of fare above the 5-cent maximum fixed by the company's franchise agreement with the city. On this question the chairman said:

"This commission some two months ago took this position in the North Shore Traction case, where, after a hearing, it was found that the railroad, by the facts presented, was entitled to an increase in fare, but the commission, under its view of the law, as now upheld by the highest court, felt that its power was limited by the 5-cent maximum fixed in the franchise."

"If you feel that the company which

employs you is not receiving from its rate of fare a sufficient return to be able to pay you adequate wages, the only remedy open to you, in view of this recent decision of the highest court of the State, is to invoke the aid of the city authorities, with a view of obtaining their consent to an amendment of the franchise limitations. Without such an amendment by the city, the hands of the commission are tied, and rightfully so, because if any change in a solemn franchise is to be made, it ought in simple justice to be made by the parties to the original agreement, to wit, by the city of New York and the railroad company, before any other governmental agency can step in and vary the terms of the agreement which these two parties made."

Mr. Straus urged the men to bear in mind they were quasi-public servants and that they owed the public the duty of maintaining the surface railroad facilities of the city intact and serving the public without break or interruption. He said:

"The public in turn should recognize that it owes you men a duty also, and if necessary should be willing to approve a slightly higher fare for your company to make possible the payment to you of the prevailing and adequate rate of wage so that you may receive a fair return for your labor. To this end you may be assured of my earnest sympathy and support."

The committee thanked Chairman Straus for the commission's friendly interest, and announced its intention of taking the matter of a franchise modification up with Mayor Hylan and the Board of Estimate & Apportionment.

On April 11 Governor Whitman also advised the men to seek conferences with the officials in their home cities, with the end in view of changing the existing franchise agreements.

## Wage Increase in St. Joseph

The trainmen in the employ of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., and the management have agreed to a wage increase of 2 cents an hour for the men. The original request was for an advance of 5 cents an hour. An increase the first six months is one feature of the new scale. New men will receive 27 cents an hour and after six months an increase of 1 cent an hour. After the first year, the men will be increased yearly as before. During the fourth year the men will receive the maximum, 32 cents an hour. The extra men will also receive an increase of \$5 a month. Their wages in the future will be a minimum of \$60 a month. In November, 1917, wages were increased 2 cents an hour and in March, 1917, they were increased 2 cents an hour.

## Chicago Traction Discussion

Considerable Headway Seems to Have Been Made at the Council Meetings on April 4 and 5

Having agreed upon the physical program for Chicago traction improvements a sub-committee of the local transportation committee of the City Council held meetings on April 4 and 5 to discuss other features of the proposed ordinance. These included length of franchise term, the question of a transfer charge, the matter of rate of return on old and new securities, the qualifications and authority of the proposed board of control, and the details of amortization.

It was tentatively agreed that the board would consist of three members with six-year terms to be appointed by the Mayor subject to approval of the Council. Mr. Busby contended that when the Traction & Subway Commission recommended a guarantee of 6 per cent on outstanding securities, this was intended only as a reasonable minimum. Even though the commission report allowed a possible return up to 8 per cent, the figures show that this would average about 6.2 per cent during the franchise period, whereas the average rate for the surface lines during the last ten years has been nearer to 7 per cent.

It developed that the commission's estimate of receipts was below the actual figures for last year. The companies pointed to this as evidence that the commission's figures were conservative.

Owing to the expected absence of several members of the committee for several weeks an adjournment was taken until their return.

### Increase in Wages in Duluth

The Duluth-Superior Traction Company, Duluth Minn., recently announced salary increases to all conductors and motormen effective April 1. The old and revised schedules in cents per hour are as follows:

	New Scale	Old Scale
First year.....	32	29
Second year.....	33	31
Third year.....	34	32
Fourth year.....	35	33
Fifth year.....	36	34
Sixth year.....	37	35

The guaranteed minimums for men reporting on the extra list remain unchanged.

Herbert Warren, vice-president and general manager of the company, made a statement in part as follows:

"In increasing the wages of our motormen and conductors at this time, the company hopes to show its disposition to recognize existing conditions affecting the cost of living and the demand for man power resulting from the war. This increase is made voluntarily, notwithstanding the fact that the rate of fare is fixed at 5 cents and all operating expenses of the company are increasing heavily in every department and will undoubtedly continue to do so."

## News Notes

**M. O. Proposal Defeated.**—The proposition to bond the city of Tacoma, Wash., for \$5,200,000 to provide funds for the purchase of the railway property of the Tacoma Railway & Power Company was defeated in the city primaries on April 2.

**Increase in Wages in Chickasha.**—The Chickasha (Okla.) Street Railway has increased the pay of its men from 20 cents an hour for the first year, 22½ cents an hour the second year and 29 cents the third year to 25 cents for the first year and 30 cents the second year.

**Waco Strike Over.**—The strike of motormen and conductors in the employ of the Texas Electric Railway in Waco has been ended. The men demanded recognition of the union and an increase in wages. Both demands were rejected by the company and the strike resulted. New employees were soon secured, however, and traffic was restored without the company negotiating with or giving recognition to the newly created union.

**License for Motormen Rejected.**—The City Council of St. Paul, Minn., has voted down an ordinance proposed by Commissioner O. E. Keller to provide for licensing of motormen by a committee composed of the commissioner of public utilities, the street car inspector and the city electrical inspector. One commissioner said if there was to be any examination of motormen it should be by experts instead of city officials.

**M. O. Bills Dead.**—A committee has reported to the New York Senate advising either to have a special committee appointed to investigate and report on municipal ownership at the next session of the Legislature or leave the matter in abeyance until another year. It is probable an investigating committee will be chosen. Under the circumstances, pending municipal ownership bills are regarded as dead as far as this session is concerned.

**Cleveland Subway Ordinance Legal.**—The Supreme Court of Ohio has rendered a decision to the effect that the ordinance providing for the appointment of a rapid transit commission and the construction of a subway in Cleveland is legal. The commission will at once ask for a bond issue of \$100,000 to provide funds for preliminary investigations and engineering work. The members of the commission are Charles A. Otis, M. A. Bradley, C. E. Adams, Street Railway Commissioner Fielder Sanders and Finance Director Neal.

**Increase in Wages in Louisville.**—In response to a request of the employees of the Louisville (Ky.) Railway for an

increase in wages, the board of directors, through Samuel Riddle, superintendent of transportation, has announced that the wages of all employees will be increased 3 cents an hour. The rate of pay under the new schedule will be as follows: for first year, 27 cents an hour; second year, 28 cents; third year, 29 cents; fourth year, 30 cents; fifth year and thereafter, 31 cents. The increase went into effect on April 1.

**Mr. Taylor Opposes Philadelphia League.**—In connection with the hearings before the Public Service Commission of Pennsylvania in regard to the final adoption of the rapid-transit lease between the Philadelphia Rapid Transit Company and the city, A. Merritt Taylor, formerly director of the Department of City Transit, filed on March 27 a brief of objections. Mr. Taylor not only criticised in detail various provisions of the league but also stated that the present time was not a proper one for the consummation of a long-term contract.

**Bridge Tolls Decision Favors Company.**—The Appellate Division of the Supreme Court of New York has affirmed the Supreme Court's decision in favor of the Brooklyn (N. Y.) Union Elevated Railroad and the New York Consolidated Railroad (Brooklyn Rapid Transit System) in the suit brought against them by the city of New York. The city sued the corporations for tolls over the Williamsburg Bridge from Aug. 4, 1913, to May 1, 1914. The decision holds that a new contract made in March, 1913, supersedes the previous agreement of 1907.

**Wage Increase in Atlanta.**—The Georgia Railway & Power Company, Atlanta, Ga., increased the wages of its trainmen 3 cents an hour on April 1. This increase will amount to about \$85,000 for the year and is in addition to an increase of 1 cent an hour which became effective on Jan. 1, 1917, and to a second increase of an additional 2 cents an hour which became effective on Nov. 1, 1917. The scale of wages per hour under the increase in effect on April 1 is as follows: first year, 25 cents; second year, 27 cents; third year, 29 cents; fourth year, 30 cents; fifth year, 31 cents; sixth year and thereafter, 32 cents.

**Relief Proposed for New York Contractors.**—In order to insure the prompt completion of important subway lines in New York threatened by the inability of certain contractors to carry out their agreements, there has been introduced in the Legislature on behalf of the Public Service Commission for the First District a measure which may have the result of providing such relief as is necessary. The contractors contend that the increasing cost of labor and materials and delays in the delivery of materials have brought the majority of them to the verge of bankruptcy. The contractors prepared a bill to meet the situation, and introduced the measure in the Legislature,

but the commission did not approve this because of its mandatory character.

**Railway Wins Paving Case.**—In the suit of the City of New York against the New York Railways to recover \$2,161 for pavement repairs on Lexington Avenue, the Appellate Division of the Supreme Court has directed a verdict for the defendant. The case involved the question of the duty of the railway to maintain pavement after temporary restoration following subway construction. In this instance, at the completion of the subway work, the contractors restored the pavement, but at the end of six months it had settled so that repairs became necessary. The city notified the company to repair the pavement in the railway area. The company refused to comply, contending that the contractors were responsible for the restoration of the pavement to its original condition. The decision is regarded as particularly significant in New York, since the paving along the lines on Lexington and Seventh Avenues is affected by the subway construction in progress in those thoroughfares.

## Programs of Meetings

### Foreign Trade Convention

The fifth convention of the National Foreign Trade Council will be held at the Gibson Hotel, Cincinnati, Ohio, on April 18, 19 and 20. The theme is "The Part of Foreign Trade in Winning the War." Those who desire to receive invitations to attend the convention at Cincinnati are requested to send their names and addresses to O. K. Davis, secretary National Foreign Trade Council, 1 Hanover Square, New York City.

### American Institute of Electrical Engineers

It has been decided to hold an annual convention of the American Institute of Electrical Engineers in Atlantic City, N. J., on June 26, 27 and 28, 1918. Among the papers likely to be presented are the following:

"Split-Conductor Cables—Balanced Protection," by W. H. Cole; "Overhead Cables," by E. B. Meyer; "Wood-Stick Insulators," by H. H. Cochrane; "The Applications of Theory and Practice of Transmission Systems," by G. I. Gilchrist; "America's Power Supply," by C. P. Steinmetz; "Education," by D. C. Jackson and M. W. Alexander; "Charged Condensers," by V. Karapetoff; "Method of Symmetrical Coordinates Applied to the Solution of Polyphase Network," by C. L. Fortescue; "Flux Distribution in Alternators Under Sustained Short-Circuit Conditions and Different Loads," by N. S. Diamond.

The meeting will open at 10.30 a. m. on June 26, with an address by the president. An informal reception will be held at the Marlborough-Blenheim Hotel at 8.30 the same evening.

# Financial and Corporate

## Costs Mounted

### Commonwealth Company Shows How Expenses Climbed During January and February

Unprecedented storms and extreme cold weather in January and the early part of February caused such damage and extraordinary expenses that the board of directors of the Commonwealth Power, Railway & Light Company, Grand Rapids, Mich., has deemed it advisable to explain the operations for these two months. The statement follows:

"These conditions and the critical shortage and the very poor quality of coal, brought an unusual burden to the company in numerous ways. There were many days when it was impossible because of the snow to operate inter-urban cars, and when operation in towns was very seriously interfered with. The increased cost of the removal of such vast quantities of snow was very heavy, as was also the increased cost of car repairs, due to the great strain on the equipment, attendant upon operation in such extreme winter weather.

"Added to this was the acute coal shortage, curtailing the operation of the company's properties to a great extent, and necessitating the cutting off of electric power to customers on many occasions. Also the quantity of the coal received was most unsatisfactory and entailed a heavy additional expense. Because of the shortage of gas coal, the gas plants were forced to make a much larger amount of water gas than usual, necessitating the use of a much greater quantity of gas oil at greatly increased prices.

"As an indication of the increased cost of operating the properties because of the weather and coal shortage in January and February, 1918, over corresponding months of 1917, the following statement of such increased costs is appended:

	January	February
Coal for electric plants	\$51,000	\$28,000
Coal for steam heating	43,000	14,000
Gas coal and oil	91,000	84,000
Snow removal	53,000	15,000
Car repairs	22,000	42,000
	\$260,000	\$183,000

## Dividend Policy Outlined

The report of the Standard Gas & Electric Company, Chicago, Ill., contains the following reference to the dividend policy of the company:

"The uncertainty of the times makes it increasingly difficult to forecast dividend distributions. It is unlikely that the conditions produced by the war will permit any increase in the preferred stock rate during the current year over the 6 per cent now being

paid. Construction requirements have been reduced to a minimum in accordance with the general request of the government to conserve materials and money for war purposes. It is impossible, however, to cut off construction entirely. Should it become impossible to finance necessary improvements and extensions, your company may find itself compelled to apply its earnings to such purposes, even to the extent of reducing its dividends.

"At this time, however, it seems improbable that resort will have to be made to an emergency measure of this nature. Practically all of your subsidiaries are in a position to finance their respective requirements in any but the most extraordinary times. Even in such times they will not necessarily have to rely exclusively upon your company for funds if the service to be rendered by the anticipated War Finance Corporation is correctly interpreted. In this connection it is again emphasized that the rapidly growing gross earnings of the subsidiaries are much less due to war conditions than are the abnormally high operating costs, and that materially increased net earnings must follow the return of normal times. This would quickly be reflected in your company's collectible income and correspondingly increased dividend rates."

## C. D. & T. Reorganization Planned

Owners of bonds of the Cincinnati, Dayton & Toledo Traction Company, deposited under an agreement of Jan. 12, 1916, have been notified by the bondholders' committee that the property has been purchased by it and that a plan of reorganization has been adopted. A company with a capital stock of \$1,250,000, all common, is to be formed to take over the property. As a matter of fact, the Cincinnati & Dayton Traction Company has been organized for this purpose, as already stated in the ELECTRIC RAILWAY JOURNAL, and the Public Utilities Commission has authorized the reorganization.

The company will issue \$250,000 of 5 per cent ten-year bonds on the line between Spring Grove and College Hill, with a branch to Mount Healthy; \$500,000 of bonds on the Lindenwald power house and \$250,000 on the equity in the Hamilton city lines.

All of the stock and bonds go to the committee as part payment for the property, but will be held to insure the completion of the plan, which contemplates the exchange of all the above bonds and all of the \$2,300,000 of underlying bonds for like amounts of an issue of \$4,500,000 of first and refunding consolidated mortgage 5 per cent twenty year bonds on the entire property.



## Rapid Transit Deficits

Commissioner Whitney Shows Total of \$6,000,000 for City and Company—  
Each Passenger Cost 6½ Cents

A report concerning the deficits in operation from the new lines of the dual rapid transit system in New York has recently been made public by Commissioner Travis H. Whitney of the Public Service Commission for the First District. It was known at the time of the signing of the rapid transit contracts in 1913 that there would be such deficits from operation on some of the new lines, particularly in the outlying suburban districts, for several years after operation over them had begun. Some of these lines were built in districts relatively small as to their population, but giving promise of great population increases in the near future, at which time the deficits will probably be entirely wiped out or greatly reduced.

Under the contracts with the Brooklyn Rapid Transit Company and its subsidiaries, provision was made that with the beginning of operation of the first of the new city owned lines, the earnings should be pooled and deficits in operation shared by the city and company. The first operation under the dual contracts by the Brooklyn Rapid Transit Company began on Aug. 4, 1913, at which time the Center Street loop was placed in operation. Since then the total city and company deficits have amounted to about \$6,000,000. It is shown that the total cost, including operating expenses and fixed charges, is equal to about a 6½ cents for hauling each 5-cent fare passenger. Commissioner Whitney points out that the deficits are in excess of original estimates and that this is largely due to war conditions. He noted also that some consideration must be given to reducing the amount of the city's deficit.

Under the city's contract with the Interborough Rapid Transit Company, a somewhat different arrangement was made by which the consideration of deficits became necessary upon the placing in operation of certain of the new lines. Such of the new Interborough lines as have already been placed in operation, Commissioner Whitney finds, have showed a deficit of about \$1,250,000, or an amount only about \$100,000, less than the total gross revenues. He indicates, however, that as soon as the principal branches of the Interborough line are placed in operation, including the tunnel to Brooklyn, the revenues of the first subway will be pooled in the earnings and take care of the charges on the lines which are not yet fully developed.

## Toronto Railway Outlook Better

Sir William Mackenzie, president of the Toronto (Ont.) Railway, recently made a statement in regard to the report that he had been disposing of his holdings in the company. He is reported by the Canadian *Financial Post* to have said that he has not been sell-

ing recently. His present holdings are 2182 shares. He has been head of the company for twenty-seven years. With respect to the franchise situation, he is reported to have said that during the last five years there never was a chance for getting together with the city, but that things were changing. The recent reduction in the dividend was necessary in order to secure the renewal of the short-term notes which the company had been compelled to float.

## Tramways in Japan

The report of the Imperial Government Railways of Japan for the year ended March 31, 1916, contains a section devoted to tramway lines in Japan proper. The results of the working of these for the year under review are shown in the following table:

STATISTICS OF JAPANESE TRAMWAYS FOR 1916

	Electric Tramways	Steam Engine Tramways	Gas Motor Tramways	Horse Tramways	Rikisha Tramways	Total
Number of tramways..	64	22	4	34	14	138
Mileage open .....	667.66	211.65	60.56	244.18	70.40	1,256.05
Mileage under construction .....	232.62	38.34	2.07	12.36	3.23	289.02
Capital (yen) .....	264,106,120	5,864,244	1,290,000	2,841,990	909,500	374,511,854
Cost of construction (yen) .....	277,017,116	5,370,111	1,022,361	2,119,858	849,197	287,377,643
Locomotives .....	5	147	79	...	...	228
Carriages .....	3,849	182	88	437	128	4,684
Wagons .....	251	301	132	577	618	1,779
Passengers carried ..	624,890,286	6,428,420	2,822,032	4,064,980	277,449	638,488,167
Passenger earnings (yen) .....	24,882,962	605,908	225,271	379,178	26,509	26,119,828
Goods hauled (tons)...	468,158	271,061	79,575	134,181	358,662	1,311,684
Freight earnings (yen) .....	334,926	137,065	63,163	127,960	148,676	801,790
Total revenue (yen)...	38,666,330	767,889	297,908	581,894	344,277	40,668,298
Total expenses (yen)...	25,377,798	600,311	210,264	610,841	298,951	26,897,666
Profit (yen) .....	13,288,532	267,578	87,644	71,553	45,326	13,780,642
Employees .....	14,638	796	361	841	628	17,065

Notes: Yen=\$0.4985.

## War Finance Bill Signed

President Wilson on April 6 signed the War Finance Corporation bill, creating a government corporation with a capital of \$500,000,000 and authority to issue \$3,000,000,000 of bonds, designed for the aid of industries engaged in work essential to the carrying on of the war.

It is reported from Washington that when the directors of the corporation are appointed they will find a huge pile of applications for money on their desks. Applications already made are said to vary from \$5,000,000 to \$60,000,000. Applications cover all character of public utilities claimed by the applicants to be war necessities.

The terms of this measure have been referred to previously in the *ELECTRIC RAILWAY JOURNAL*.

## Navy Runs Railroad

The Navy Department has taken over the Cape May, Delaware Bay & Sewell's Point Railroad, Cape May, N. J., including the local line from the Reading Railroad station to the beach. It has bought the equipment outright out of \$175,000 recently appropriated by Congress. The men of the naval reserve are at work putting the road in order for the operation of cars. Service over the line was discontinued following appointment of a receiver two years ago.

## Financial News Notes

**Income Interest Declared.**—The directors of the Chicago (Ill.) Railways have declared the 4 per cent interest on the \$2,500,000 of adjustment income bonds for the year ended Jan. 31, 1918, payable on May 1.

**Billings Line Being Removed.**—The system of the Billings (Mont.) Traction Company is being torn up and the rails removed from the streets by the company. The rails are being stored in the company's carhouse on Division

Street. No cars have been operated by the company since last fall.

**Bondholders Cannot Recover from Directors.**—The United States Supreme Court has upheld the California decree denying the right of the bondholders of the Ocean Shore Railroad, San Francisco, Cal., to recover from the directors of the company, which had been declared insolvent.

**Action on Dividend Put Over.**—Action on the dividend on the common stock of the Philadelphia Company, Pittsburgh, Pa., due at this time, has been deferred until April 27, when a special meeting of the directors will be held to consider the dividend. The company controls the Pittsburgh Railways.

**Extension of Lease Payment.**—The United Power & Transportation Company, Philadelphia, Pa., has granted the Trenton & Mercer County Traction Corporation, Trenton, N. J., lessee, a further extension until July 1 for the payment of the rental due on Jan. 1, 1918, on account of the Trenton street railway properties.

**Directorate Increased.**—The Northern States Power Company, Chicago, Ill., has increased its directorate from fifteen to seventeen members. B. W. Lynch and M. A. Morrison of H. M. Pylesby & Company have been elected to the board. H. C. Cummins has been elected a director in the place of W. R. Thompson, who resigned.



**Dividend Passed at Trinidad.**—The Trinidad (Port-of-Spain) Electric Company has omitted the quarterly dividend ordinarily payable on April 10. The dividend was resumed in July, 1917, after having been suspended in 1915. Since the resumption of the dividend the government has imposed a war contribution tax which the company has been compelled to pay, amounting to \$20,018. This is a charge against the company, the imposition of which the directors were unable to anticipate. They consider the tax most inequitable and "are pressing the matter with all diligence."

**Stockholders Notified of B. R. T. Dividend Action.**—Formal notice has been sent to the stockholders of the Brooklyn (N. Y.) Rapid Transit Company of the resolution adopted by the board of directors on Feb. 28, approving the recommendation of the executive committee that action upon the quarterly dividend, regularly payable on April 1, be postponed until a subsequent meeting of the board. While the company's net profits justify the declaration of the usual dividend, the committee believed it advisable to withhold action pending negotiations relative to the \$57,735,000 secured gold notes maturing on July 1.

**Sold Under Foreclosure.**—The property of the St. Joseph Valley Railway, Elkhart, Ind., has been sold at receiver's sale for \$390,000 to Benjamin Harris & Company, Chicago, Ill. The plan is to dismantle the road as soon as the Superior Court ratifies the sale. The sale was made by J. H. State, an attorney, representing Herbert E. Bucklen, the receiver, a son of the late Herbert E. Bucklen, Elkhart, whose ambition was to build an electric railway to connect Toledo and Chicago. The Indiana Public Service Commission concurred in the Superior Court's order of sale when it was shown that the property had always been a losing proposition. The road is 9 miles long.

**Seattle's Municipal Ownership Losses.**—Seattle's two municipal car lines, Division A and the Lake Burien line, were operated during the month of February, at a loss of \$2,509, including interest and common user charges and excluding depreciation. Division A, extending to the north city limits through

Ballard, earned \$476 more than the actual cost of operation, not including \$295 for common user on Fourth Avenue, which will be included in the March report for February operation, and interest. In February 153,289 people were carried on the Ballard line, and the revenues were \$7,159, with operating expenses at \$6,683. On the Lake Burien line, 27,276 passengers were carried, with revenues of \$1,639 and expenditures of \$2,236, a loss of \$596, with no interest to consider.

**Another Road Suspends.**—A. L. Abington, general manager of the Fort Scott Gas & Electric Company, Fort Scott, Kan., controlled and operated by the Light & Development Company, St. Louis, Mo., reports that operation of the 7-mile railway of the Fort Scott company has been permanently discontinued. The company recently made a plea for relief from municipal restrictions which it considered unduly burdensome, and conferences were arranged through the local Chamber of Commerce looking toward the company receiving some measure of help. It would seem from the decision to discontinue operation that the company was unable to secure terms which it deemed essential to insure the successful operation of the railway. Proceedings in connection with the matter were referred to in the ELECTRIC RAILWAY JOURNAL for March 9, 1918, page 476.

**Reorganization Cost Allowances.**—The City Commission of Dallas, Tex., has finally disposed of the application of the Dallas Railway—the consolidated railway lines under the Strickland-Hobson franchise—to add the cost of reorganization of the companies to the property valuation to be used as a basis in calculating returns from operation and the fares based thereon. An addition of \$100,000 was allowed by the commission, such increase in value to date from Nov. 21, 1917, the date on which the service-at-cost franchise became effective. A like addition has been allowed for the Dallas Power & Light Company, also a Strickland-Hobson property. This is a cut of \$100,000 from the amount originally asked by the companies. The items rejected consist of the postcard pre-election vote, hire of bands, halls, speakers, etc., for

promoting the interests of the companies during the franchise campaign.

**Holders Asked to Deposit United Railways 4's.**—The committee formed in the interest of the holders of the first general mortgage 4 per cent gold bonds of the United Railways, St. Louis, Mo., due 1934, consisting of N. A. McMillan, president of the St. Louis Union Bank, chairman; Edwin G. Merrill, president of the Union Trust Company, New York, and Edward Malinckrodt, J. Herndon Smith, and M. Kotany, St. Louis, has decided that conditions facing the company render it necessary to ask holders to deposit their bonds immediately in order that steps may be taken to safeguard their interests. The advertisement calling for deposits directs attention to the adoption by the Board of Aldermen of St. Louis of the settlement ordinance calling for a material reduction in the present outstanding securities of the company. Holders of bonds of the St. Louis Transit Company have been requested to deposit their bonds with a committee of which Edwin M. Bulkley, of Spencer Trask & Company, New York, is chairman.

**Bonds of Southern New York Company Offered.**—P. W. Brooks & Company, New York, N. Y., are offering at 96 and interest to net about 6½ per cent \$950,000 of Southern New York Power & Railway Corporation first mortgage 6 per cent ten-year gold bonds. The Southern New York Power & Railway Corporation is the successor to the Otsego & Herkimer Railroad. It operates an interurban line between the cities of Oneonta and Mohawk, connecting with Cooperstown and passing through Richfield Springs, a total of 68½ miles of track, with trackage rights to Utica and Herkimer. It also owns and operates five hydroelectric or steam power stations and more than 70 miles of high-tension transmission lines. The authorized capital of the company consists of \$774,900 of common stock, \$1,000,000 of 7 per cent cumulative preferred stock and \$5,000,000 of first mortgage 6 per cent ten-year bonds. Of these amounts the following are issued: all of the common stock, \$500,000 of the 7 per cent preferred stock and \$950,000 of first mortgage bonds.

Electric Railway Monthly Earnings

HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.						TAMPA (FLA.) ELECTRIC COMPANY					
Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income	Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Feb., '18	\$538,938	*\$279,650	\$259,288	\$217,152	\$42,136	1m., Jan., '18	\$86,449	*\$52,210	\$34,239	\$5,083	\$29,156
1m., Feb., '17	497,800	*231,327	266,437	216,203	50,270	1m., Jan., '17	92,314	*47,579	44,735	4,255	40,480
2m., Feb., '18	1,114,865	*571,458	543,407	434,684	108,723	12m., Jan., '18	995,445	*568,169	427,276	56,948	370,328
2m., Feb., '17	1,039,095	*465,660	573,435	432,434	141,001	12m., Jan., '17	972,695	*531,457	441,238	52,372	388,866
PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.						CLEVELAND, PAINESVILLE & EASTERN RAILROAD, CLEVELAND, OHIO					
1m., Jan., '18	\$589,787	*†\$344,825	\$244,962	\$178,895	\$66,067	1m., Jan., '18	\$40,772	*\$27,973	\$12,799	\$11,321	\$1,478
1m., Jan., '17	490,231	*260,189	230,042	182,338	47,704	1m., Jan., '17	36,436	*22,134	14,302	11,436	2,866
12m., Jan., '18	6,123,067	3,661,231	2,461,836	2,148,609	313,227	LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO					
12m., Jan., '17	5,518,352	3,040,711	2,477,641	2,178,833	298,808	1m., Jan., '18	\$141,554	*\$115,307	\$26,247	\$36,125	\$9,878
REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO						1m., Jan., '17	129,505	*94,926	33,579	34,374	†795
1m., Jan., '18	\$484,586	*\$350,410	\$134,176	\$88,903	\$55,271	REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO					
1m., Jan., '17	379,782	*257,105	122,677	78,725	\$44,796	1m., Feb., '18	\$460,246	*\$332,815	\$127,431	\$99,864	\$36,644
12m., Jan., '18	4,994,719	*3,434,488	1,560,231	1,014,605	\$549,633	1m., Feb., '17	357,645	*251,644	106,001	78,685	\$28,301
12m., Jan., '17	4,049,083	*2,399,050	1,650,033	842,037	\$829,550	12m., Feb., '18	5,097,320	*3,515,660	1,581,660	1,035,783	\$630,679
*Includes taxes. † Deficit. ‡ Includes non-operating income. †† \$17,560 includes for depreciation.						12m., Feb., '17	4,096,270	*2,467,554	1,628,716	856,382	\$792,108

# Traffic and Transportation

## Queue Loading in Detroit

Opportunity for Others to Emulate Detroit and Reform Manners Notoriously Bad as Regards Car Etiquette

Some queue loading is done at present on the lines of the Detroit (Mich.) United Railway, but the company is making a vigorous plea for more of it as a time saver. People bow to the rights of others, it seems, nearly everywhere except on a street car. There the race to board is to the strong. The hog asserts himself. The man who knows that he would get a bat over the head if he tried "rough house" tactics at a ball game, a theater or other public place feels sure of immunity if he indulges his atavistic self when boarding a car.

### RAILWAY STARTS CAMPAIGN

The company in Detroit recently called the attention of its patrons to the matter in *Electric Railway Service* for March 29. It said in part:

"When you go to purchase a ticket at the theater and you find other people already there you don't rush to the window and shove the other people away in order that you may be served first.

"Of course you don't. If you tried it the chances are more than equal some one would bat you over the head. What you do is to take your position in line. If you are fifth you stand fifth in the row; if you are number 100 you know there are ninety and nine to be served before. You keep your place and you move up with the row although you may be uncertain whether seats will be left or you will get a pasteboard calling for standing room only.

"When you go to Navin Field, see Hughey Jennings eat grass and view Iy Cobb slide into first you don't tear your coat into shreds nor elbow the next fellow out of the way in order to beat him inside the ball grounds.

"Of course you don't. You go through the turnstile in an orderly manner and in your turn. If you tried the other plan—oh, well you wouldn't because you know blamed well something unpleasant would happen to you.

### PLEA FOR ORDERLINESS

"Why can't there be the same orderly, sane and pleasant manner of boarding a street car when there are a number of people all desirous of traveling at the same time?

"Just because you may happen to be a husky chap is no valid reason why your strength should give you the right of way into the car. Nor should your weakness be permitted to force you to the rear.

"The proper way for people to enter a street car is in order of their arrival at the car stop. To accomplish this the

thing is to line up one behind the other. This is what is known as queue formation.

"A nice thing in theory but something that will not work out in practice you say?

"Oh, but you are wrong—very much wrong—if you think it cannot be done.

"Queue loading of cars is quite common in other countries. It is the absolute law of many municipalities in Great Britain.

"And queue loading is done right here in Detroit. But not enough of it is being done here, for which we are sorry. More of it is certain to be done in Dynamic Detroit for which we are very, very glad.

"We claim for the queue formation of passengers awaiting to board cars that it has many advantages over the common method. These advantages accrue to the company and to our customers—chiefly to our customers. The chief advantage of queue loading is the saving of time in each car getting its quota, hence permitting the car to leave so much the sooner and go on its way distributing our customers at their respective streets. This helps us and it helps the car rider.

"Not only is there the saving of time, which is mighty important in these days of hurry and hustle, but queue formation does away with disputes and dangers; it protects the weaker from the onslaughts of the more vigorously constituted people."

Accompanying the article were two pictures—one showing queue loading on Woodward Avenue opposite the Ford motor plant; the other showing improper loading of cars during the rush hour out Chene Street.

## Trenton-Princeton Fare Hearing

A hearing was held on April 9 before the Board of Public Utility Commissioners of New Jersey in the matter of the New Jersey & Pennsylvania Traction Company's application to increase its fares from 5 cents to 6 cents in each of the four zones between Trenton and Princeton. The company contends that the present 5-cent fares are unjust, unreasonable and insufficient to enable it to provide the service demanded by the public and to maintain the integrity of its securities.

In addition to wanting to boost the 5-cent fare to 6 cents in each of the four zones of the company, permission is asked to withdraw the block tickets, which are sold at the rate of twelve for \$1, each ticket being good for a ride between Lawrenceville and Trenton or Lawrenceville and Princeton. It is claimed that the privilege extended to passengers by the sale of these tickets has been abused.

## Raise After Four Years

South Carolina Commission Sanctions Increase in Fare From Twenty-five Cents to Forty Cents

The Railroad Commission of South Carolina has recently authorized the Augusta-Aiken Railway, controlled by the Augusta-Aiken Railway & Electric Company, Augusta, Ga., to establish a fare of 40 cents from Augusta to Aiken, the fare for each zone to be 5 cents. The former rate between the cities was 25 cents.

### A FOUR-YEAR FIGHT

The question of an increase in passenger fare over the railway has been under consideration by the commission for the last four years. The company asked for a 50-cent rate from Aiken to Augusta and for a system of zones which would guarantee to the company not less than 2 cents a mile for each mile traveled. The commission refused this petition. The company then appealed to the courts. After hearing before one of the circuit judges, it was ordered that the South Carolina Commission had erred and that the railway should have been granted an increase of rates. The circuit judge expressed the opinion that the amount prayed for in the petition was reasonable. The court directed the commission to reopen this case and expressed its opinion that at this rehearing the Augusta-Aiken Railway should be granted the increased rate. From this decision an appeal was taken to the Supreme Court of the State. There the matter was pending when the commission entered its present order.

### COMMISSION NOW SEES NEED

John G. Richards, chairman of the Railroad Commission, in his letter to W. C. Callaghan, general manager of the Augusta-Aiken Railway, allowing the company to establish the 40-cent rate, said:

"The commission realizes that on account of the changed conditions brought about by the war, the increased cost of material, the increased wage scale, in fact, the increase in the cost of everything necessary in the proper operation of a railroad, the company is entitled to some increase in its passenger fare. However, the commission, as much as it regrets to disagree with a member of the courts of the State, feels that a 100 per cent increase over the rate now in operation is neither reasonable nor just, nor do the necessities of the case demand such a sweeping increase. Therefore, to meet the demands of the Circuit Court at least in part, and to give to the Augusta-Aiken Railway a rate which the South Carolina Commission feels is just and reasonable under present conditions, the commission submitted to you the rate as set forth in the letter which we have received from you. The commission is pleased that your company has seen proper to accept a rate of 40 cents from Aiken to Augusta and a 5-cent rate for each of the eight zones which are herein set out. By so doing, the whole question

can be settled, and the litigation pending in the Supreme Court stopped."

The order of the commission directing that the rate for passenger fare shall be 40 cents from Aiken to Augusta, with 5 cents as the charge for each zone, is to remain in force for ninety days. The commission, however, reserves to itself the right, after that period, and after investigation, to rearrange the zones so as to meet the demands of the travel that develops during this period.

## Cleveland and Columbus

### Train Operation, Skip Stops and Faster Schedules Work to Advantage of Former City

Councilman Lamneck and Samuel G. McMeen, president of the Columbus Railway, Power & Light Company, Columbus, Ohio, both addressed the Kiwanis Club in that city on the evening of March 27. Following the addresses the resolution of the public activities committee of the club urging the Council to allow the company's request for an increase from eight tickets for 25 cents to six tickets for 25 cents was referred back to the committee for discussion at a future meeting.

On the following day the company in an advertisement, signed by President McMeen, replied to statements made by Mr. Lamneck. In this statement many comparisons were made between Cleveland and Columbus. Later in replying to the question of why it costs 1.566 cents per ride to operate the Columbus road and only 1.38 cents to operate the Cleveland road, the Columbus company said:

#### THE DIFFERENCES EXPLAINED

"1. The density of population in Cleveland is 12,000 per square mile and in Columbus it is 8000. This increases the number of rides possible in any one hour or on any one trip, and the greater the number of riders in a given time on a given unit of operation, the lower the cost per ride. The density of the population is the measure of the opportunity of doing a street railway business and the greater the opportunity the less the cost per unit of service. This opportunity is 50 per cent greater in Cleveland than in Columbus.

"2. A very large number of cars in Cleveland are operated in trains of two cars, manned by three men. In Columbus four men are necessary for each two cars. This materially affects the cost of producing each ride.

"3. The Cleveland cars ran nearly a mile an hour faster; skip stops were the rule in Cleveland all of last year and were not in Columbus. This resulted in 177 miles a day of eighteen hours for each car in Cleveland, as against 163 miles a day in Columbus. This affects the cost of producing each ride.

"4. More modern equipment has its effect in lessening the cost of producing the service in Cleveland as compared with Columbus."

## Another Case Involving Franchise Obligations

### Cities in Washington Make Plea in Behalf of Franchise Integrity in Case Brought to Require Commission to Fix Reasonable Fare

The Supreme Court of Washington, at Olympia on March 29 took under advisement the mandamus suit of the Tacoma Railway & Power Company against the Public Service Commission, to compel the commission to set aside the Tacoma franchise obligations, and fix a reasonable fare other than 5 cents, if found necessary. Eight judges heard the arguments.

#### THE ATTORNEY GENERAL'S ATTITUDE

Attorney General Tanner, who was statutory legal representative for Commissioners Spinning and Lewis, at the opening of the case announced his inability to act in that capacity, because the two commissioners had refused to sign and verify the answer he had made outlining his position, and wished to strike from his answer several points which he regarded as highly important. Attorney-General Tanner asked the right to appear as counsel for the people of the State and bring in the arguments which he had presented. This permission was granted, and he was joined in preparation of the case by City Attorney Harmon of Tacoma.

In opening the company's case, Attorney James B. Howe declared that the company was not asking for a specific judgment, but for a ruling by the Supreme Court. He stated that the company desired the Supreme Court to pass on the questions presented, so that the company may know whether or not the Public Service Commission has the power to set aside franchise provisions and to grant a fare of more than 5 cents. Mr. Howe asserted the company found that after it had paid its operating expenses and taxes, there was not enough left to pay the nominal depreciation on the property or to keep the properties up. He declared that the commission had power to require adequate service, and that this implied power to take away the franchise provisions or other conditions that hindered the company from obeying the commission's orders. He further declared that the present high wages offered to men in other lines of work made it impossible to keep men and that the company's receipts would not permit of further wage advances.

Scott Z. Henderson, who appeared for Chairman Blaine, asserted that Commissioner Blaine had not taken sides with the company but that he believed the commission had full power to act. He urged the court to order Commissioners Spinning and Lewis to do their duty.

Attorney General Tanner contended that the company had taken the wrong legal method of obtaining redress. He asserted that mandamus proceedings could not lie in this case. Mr. Tanner planned an attack upon the company's course in asking for a writ of mandamus to direct the Public Service Com-

mission how to proceed in a case it had not yet passed upon. The latter case was the complaint of the Tacoma Commercial Club against inadequate service furnished in Tacoma as a whole. It was filed with the commission, but not formally considered. The company alleged, in asking for a writ, that the majority of the commissioners had refused to grant relief in a similar case brought by J. E. Blomberg, and would follow the same course in the Tacoma Commercial Club's case unless otherwise directed by the Supreme Court.

Mr. Tanner opposed this assumption on the ground that it could not be officially known what action would be taken by the commission in the case still to be tried, until the commission had made a decision and that the Supreme Court could take no jurisdiction until it had been so disposed of by the commission and referred to the Supreme Court in the regular course of review. He stated that in the Blomberg case, the question of increasing the 5-cent fare had not been raised, but that it was now raised by the company. He also questioned whether the Supreme Court could reinvest the commission with jurisdiction in the case that it had already passed upon, through a writ of mandate governing another hearing still to be held, the general challenge being directed to the method followed by the company, and the nature of relief asked. Mr. Tanner contended the process of writ of law provided ample remedy.

This form of defense Commissioners Lewis and Spinning refused to indorse because of their purpose to have it appear that they would follow their former course in refusing to attempt to revoke franchise requirements, and to increase the 5-cent fare if the question of jurisdiction were raised in the Commercial Club complaint when that was heard. They want the Supreme Court to dispose of the vexed question of commission jurisdiction before another hearing involving that question was called.

#### MR. CALDWELL CLOSES FOR CITIES

Alex Winston, assistant city attorney for Spokane, joined with Attorney-General Tanner and City Attorney Harmon of Tacoma, and Corporation Counsel Hugh M. Caldwell, Seattle, in calling attention to previous pleas by the company in which it had asked concession on the admission that it was unable to realize more revenue by increasing fares on account of the statutory 5-cent limitation. Mr. Caldwell closed for the cities with a vigorous plea in behalf of franchise integrity. He supported Mr. Tanner's view that the company has adequate remedy in applying for a writ of review rather than for one of mandate to perform something it had not yet passed upon.

## Service-at-Cost Discussed

Company at Columbus Shows What a Grant With Such Provision Means to City

The publicity campaign of the Columbus Railway, Power & Light Company, Columbus, Ohio, is now turning to the service-at-cost plan. In one advertisement used recently the company compared the present service with what might be enjoyed, with such a plan in operation, if the people choose to pay the real cost. Under the present contract, made in 1901, only one kind of service can be had and that is the kind provided in that agreement, and the income is not even paying for that.

The community should pay the cost of the service, the advertisement says, and the city ought to have the right of purchase at a price based upon a fair value. None of these things are included in the agreement under which the company is operating. The community is not paying and for several years has not been paying the cost of the service demanded in 1901, and the city has only a technical right to purchase the property, as neither the city nor the company knows the price at which such a purchase could be effected.

### PLEA FOR A FAIR RETURN

In another advertisement the company called attention to the fact that Columbus citizens all desire that merchants and manufacturers receive a fair return on a fair value of property used in business. Emergencies occasionally arise when returns must be increased and usually they are promptly met in this way. The railway emergency is no different from any other and should be met in the same way, until a permanent flexible service, with a flexible rate of fare, is adopted.

On April 2 Samuel G. McMeen, president of the company, asked fellow members of the Rotary Club to give the railway a fair, square deal in its request for an increase in the rate of fare, so that it may take care of increased operating and construction costs. He said that books of the company were open to any Rotarian who wishes to confirm the statements that were made in the advertisements of the company. No effort was made to have the club go on record for or against the request.

### Report on Syracuse

Charles R. Barnes, electric railway inspector of the Public Service Commission for the Second District of New York, has reported the result of his study of traffic conditions on the lines of the New York State Railways in Syracuse. Mr. Barnes made a general recommendation for the rerouting certain lines. He recommended that the University Summit and West Genesee-Grape lines be divided, the Summit line to be joined with the Grape Street line and the West Genesee with the University. There are other minor recommendations for rerouting.

Mr. Barnes also recommends that all double-truck cars be equipped with air-brakes, that a certain number of single-truck cars be retired, that two sand cars be acquired, that all cars be equipped with proper destination signs, etc.

Many of the recommendations contained in the report have already been put into effect.

Mr. Barnes criticized the people of the city in the following words:

"In none of the other large cities of this State are cars so delayed in movement by the deliberate and slow progress of passengers in boarding and leaving. This delay is further amplified by the number of people who board the 'pay-as-you-enter' cars without having the proper fare ready for deposit. Before real rapid transit can be obtained in Syracuse the people must change their habits in these respects."

### The Nickel

I was once a popular fellow  
And I did a lot of things.  
But my prestige has been waning  
And my vogue has taken wings,  
And I feel my day is passing  
And my value, now I fear,  
Is like the storied bird nest  
In the treetop of last year.  
Time was when I went for sodas,  
Of the luscious ice cream sort,  
Or procured a fair "Havana"  
As a headlight for a sport.  
I was welcome at the airdrome  
At the closing of the day—  
For 'twas I who killed the "drummer"  
And made moving pictures pay.  
But "That's all shove' behind me,"  
I hear Mr. Kipling sigh,  
And my name is rarely mentioned  
Where men come to sell and buy;  
Still they take me on the street car,  
But I feel I'm in there wrong—  
For the red ink of the ledger cries,  
"How long, O Lord—how long?"  
—Kansas City Railwayman.

### Portland Fare Argument April 20

Mayor Baker of Portland, Ore., announces that if the city loses its fight before the State Supreme Court to annul the 6-cent fare order of the Public Service Commission to the Portland Railway, Light & Power Company, the Council will demand a rehearing before the commission. The Mayor plans to have the Council petition the commission to reopen and reconsider the 6-cent fare decision, on the ground that conditions for the company may have improved.

City attorneys state that such an action on the part of the Council would be a strategic mistake, and might jeopardize the city's interests.

Edward Cousin, valuation expert for the city, has been instructed to familiarize himself with all features of the fare situation, in order that the city may be properly prepared with information in asking for a reconsideration of the case if such a course is necessary. The city will endeavor to show that the valuation placed on the rail-

way is excessive, and should not be made the basis for the order for a 6-cent fare.

The hearing before the Supreme Court on the appeal of the city from the decision of the circuit judges upholding the commission in the 6-cent case will take place about April 20.

## Commission Has Jurisdiction

Missouri Body So Rules with Respect to Fare Application of the Kansas City Railways

The Public Service Commission of Missouri on April 6 rendered an informal decision that it had jurisdiction to regulate the rate of fare for street railway service. The decision followed a hearing on the subject in Jefferson City on March 26, at which briefs were submitted by the Kansas City Railways and the city.

The city contended that the franchise of the railway explicitly provided for 5-cent fares, and that the city alone had power to change this provision. Many citations were made by the railway to show that the Public Service Commission, even without the authority explicitly given by the act creating it, would have power to regulate rates as against the authority of a city which granted a franchise to the railway.

The ruling of the commission grew out of the request of the Kansas City Railways to the Public Service Commission of Kansas for increased fares. The company has a franchise in Kansas City, Kan., with seven years to run. It is probable that one or more joint meetings may be held by the two state commissions, during the progress of their consideration of the petitions now before them.

Since February the railway has been conducting a campaign of advertising, showing the need for higher fares and emphasizing the statement of President Wilson that "it is essential that public utilities be maintained."

### "Cut Out" Stops Decided Upon

The San Francisco-Oakland Terminal Railways, Oakland, Cal., has completed its program for the elimination of unnecessary stops. The company has consulted with the officials of Oakland, Berkeley and Alameda and so-called "cut out" stops have been decided upon. The Councils of the three cities mentioned have indorsed the plan by resolutions.

It is not proposed arbitrarily to eliminate "every other stop," but to skip "every unnecessary corner." The skips, however, will be so regulated as to leave no unreasonable distances between stops.

The company proposes to put the new plan into effect as fast as possible, taking one line at a time. Notices will be posted in the cars of each line prior to the change. As soon as possible after the new system is in good working order, the schedules will be revised, so as to give better service.



## Transportation News Notes

**One-Man Car in Nashville.**—The Nashville Railway & Light Company, Nashville, Tenn., is trying out its first one-man car.

**Zone Fare Increase Sought.**—The Jersey Central Traction Company, Keyport, N. J., will apply to the Board of Public Utilities Commissioners for higher fares on a zone system basis.

**Bundle Racks Required in Kentucky.**—During the final hours of the General Assembly of Kentucky a bill was passed and becomes a law under which all interurban cars will be compelled to provide bundle racks.

**City Will Appeal Hartford Case.**—It has been decided by the City Council of Hartford, Conn., to take an appeal from the recent decision of the Public Utilities Commission sustaining the 6-cent fare of the Connecticut Company in that city.

**Seven-Cent Fare for Mauch Chunk.**—The Town Council of Mauch Chunk, Pa., has consented to allow the Carbon Transit Company to increase its fares from 5 cents to 7 cents for the duration of the war and for eighteen months thereafter. The company operates 12 miles of line.

**Stark Electric Asks Increase in Fare.**—On April 2 the Stark Electric Railway, Alliance, Ohio, submitted an ordinance to the City Council of Alliance for an increase in the rate of fare as follows: Cash, from 5 cents to 6 cents; tickets, from six for a quarter to five for a quarter and from twenty-five for \$1 to twenty-one for \$1. The ordinance has been referred to the committee.

**Increase in Fare in Lexington.**—On March 24 the Kentucky Traction & Terminal Company, Lexington, Ky., increased the cash fares on its interurban lines from 2½ cents to 3 cents a mile with the exception of the through rates from Lexington, where in each instance the straight one-way ticket was increased 5 cents, thus making the former 5-cent zones, which were for a 2-mile ride, 6 cents under the present increase.

**Would Abolish Skip Stops.**—The City Council of Toledo, Ohio, on April 1 adopted a resolution abolishing the skip-stop plan adopted by the Toledo Railways & Light Company last winter. The resolution was introduced by Councilman Collins, after Councilman Curtis and Bitters had asserted that the people were anxious to have the old method resumed of stopping cars at all street intersections. H. G. Wilson, county fuel administrator, promptly notified councilmen that the skip-stop plan was advocated by the government as an aid to fuel conservation.

**Objects to Interurban Cars in City Service.**—An appeal has been taken to the Supreme Court of Ohio by the Northern Ohio Traction & Light Company in the case brought by the city of Akron to force the company to operate interurban cars within the city limits as local cars and at the city rate of fare, including the issue of free transfers. The company contends that it is a hardship to stop interurban trains and cars at each corner and carry city passengers at the local rate of fare. The contention of the city was sustained by the Court of Appeals.

**Increase in Fare Wanted in Paducah.**—The Paducah (Ky.) Traction Company petitioned the City Commissioners on April 1 for an amendment to its franchise to permit the company to increase fares from 5 cents to 7 cents. A. S. Nichols, manager of the company, presented the company's case, after the ordinance had been introduced. He stated that the company's books were open for investigation. Mr. Nichols said that 5-cent fares had been responsible for the troubles of the electric railways at Bowling Green and Henderson, Ky., as auto competition and increased costs of material and operation left no profit on a 5-cent basis.

**Reduced Rate Tickets Eliminated.**—The Railroad Commission of Wisconsin authorized the elimination of six-for-a-quarter tickets and the 3-cent fares to children under twelve years of age at Fond du Lac, effective on April 1, thus complying with the petition of the Eastern Wisconsin Electric Company to eliminate all fares of less than 5 cents. Up to April 2, the commission had rendered no decision on the company's request to apply a surcharge of 1½-cents per kilowatt-hour to the electric and power rates at Fond du Lac, and had also rendered no decision with reference to the application to eliminate the eight-for-a-quarter tickets at Oshkosh.

**Resort Line Would Increase Fares.**—Clarence L. Cole, receiver for the Atlantic City & Shore Railroad, Atlantic City, N. J., has asked the Board of Public Utility Commissioners for increased rates that would bring additional revenue of about \$20,058 a year. The company proposes to charge 12 cents instead of 10 cents between Atlantic City and Pleasantville and Linwood; 6 cents instead of 5 cents between Linwood and Somers Point, and to sell six tickets for 60 cents instead of six for 50 cents between Atlantic City and Pleasantville. The petition shows that the company had a deficit of \$17,236 in 1915; a deficit of \$17,484 in 1916, and one of \$20,050 in 1917. It is also shown that for the first two months of 1918 the deficit was about \$1,000 a month greater than for the corresponding period in 1917. It is proposed to put the new rates into effect on May 10. The commission will hold a hearing on the matter at Trenton on April 30.

**Little Rock Wants Six-Cent Fare.**—The Little Rock Railway & Electric Company, Little Rock, Ark., will ask

permission from the City Council to raise its present 5-cent fare to 6 cents, preserving the present transfer system, according to a statement by D. H. Cantrell, president of the company. Mr. Cantrell said in part: "We have delayed asking the Council for permission to raise our rates but now further delay is impossible if efficient service is to continue. We expect shortly to petition the Council to grant us permission to charge a 6-cent fare with free transfers as at present. The fairness and justice of such an increase will, we believe, appeal not only to the Council, but to all thoughtful citizens. It is not necessary for me to say that every article we use in construction, maintenance and operation has increased in price. If anything that is sold at present has not advanced in price in the last year, I don't know what it is except it is electric railway transportation."

**Council Sticks to Jitney Measure.**—In an attempt to secure the repeal of the ordinance passed on March 6, regulating and licensing jitneys in the city of Terre Haute, Ind., the jitney drivers went on strike during the week of March 24. On April 3 the jitney drivers, members of various labor unions and socialists, headed by Eugene V. Debs, paraded to the city hall carrying a petition 39 ft. in length and bearing 4730 signatures demanding the repeal of the jitney ordinance. While the demonstration was taking place the City Council met, but an attempt to repeal the ordinance was lost by a vote eight to two. The ordinance went into effect on March 19. It was upheld by the Council as being necessary to regulate the jitney properly and provide for the safety of the public. The Council stated that it was manifestly unfair to the Terre Haute, Indianapolis & Eastern Traction Company not to tax the jitneys, which were operating over the same streets and in competition with the railway.

**Wants Utility Act Made Clear on Fares.**—George L. Record, counsel for the Associated Municipalities in the case of the application of the Public Service Railway, Newark, N. J., for an increase in fares to 7 cents, has written a letter to Governor Edge urging him to call an extra session of the New Jersey Legislature to amend the public utility statute. Mr. Record says the company contends that a recent decision of the Supreme Court of New Jersey relieves it of its franchise 5-cent fare limit. He adds that the statute creating the Board of Public Utility Commissioners was never intended to have that effect and calls on the Governor to have the Legislature amend the statute. Mr. Record recommends the enactment of "an amendment of the public utility statute, providing in substance that nothing in the statute shall be construed by any court to relieve any company operating a street railway from any of the obligations imposed upon it by the original franchises granted by the local public authorities."



## Personal Mention

C. E. Cox, formerly vice-president and purchasing agent of the Chicago & Interurban Railway, Chicago, Ill., is now connected with the Mid-West Box Company, Cleveland, Ohio, where he is installing a new cost system. Mr. Cox expects to be located in Fairmont, W. Va., in the future, as manager of the West Virginia plant of the company.

P. C. Chestnut, superintendent of the New Castle Electric Railway, Youngstown, Ohio, a division of the Mahoning & Shenango Railway & Light Company, with which he has been connected for eleven years, has resigned to become general manager of the Pittsburg County Railway and the Choctaw Power & Light Company, McAlester, Okla.

R. W. Spofford, general manager of the Augusta-Aiken Railway & Electric Corporation, Augusta, Ga., who is a retired officer of the United States Navy, has been called to active service. W. C. Callaghan succeeds him as general manager. Mr. Callaghan has been with the J. G. White management organization, New York, N. Y., the operators of the Augusta company, since 1913.

C. J. Fifer has resigned as general manager of the Cleveland, Alliance & Mahoning Valley Railroad, Ravenna, Ohio, to become general superintendent of the Gary & Southern Traction Company, Crown Point, Ind. Mr. Fifer has also been secretary of the Columbus, Magnetic Springs & Northern Railway, Ravenna. He was formerly general manager of the Philadelphia, Coatesville & Lancaster Passenger Railway, Parkersburg, Pa.

Prof. George F. Sever, formerly professor of electrical engineering and acting dean of the Faculty of Applied Science at Columbia University and for over twelve years consulting electrical engineer for the department of water supply, gas and electricity for the city of New York, has been commissioned a major in the Engineer Officers' Reserve Corps, with headquarters in Washington, D. C. He has closed his engineering office in New York.

F. G. Buffe, formerly of the Illinois Traction System, has been with the Kansas City (Mo.) Railways since Sept. 1, 1917, in the office of the president, Philip J. Kealy. Mr. Buffe instituted the publicity department of the Illinois Traction System in 1909 and for five years was in charge of this work for the interurbans and city utilities of this system. He re-entered newspaper work as managing editor of the *Herald-Transcript* of Peoria, Ill., for two years. He then returned to the Illinois Traction System in the office of H. E. Chubbuck, vice-president

executive, in connection with the publicity work, labor matters, franchises, rate cases and commission hearings, and he remained with the company until he assumed his present duties at Kansas City.

H. G. Lauter has been appointed superintendent of transportation of the Chattanooga Railway & Light Company, Chattanooga, Tenn. Mr. Lauter was born in Chattanooga. Previous to engaging in electric railway work he was in the cigar business. In 1901 he began his railway career as gatekeeper for the Chattanooga Electric Railway at the old transfer station. He held this position until he was promoted to transfer agent the year following. In 1906 the Chattanooga Electric Railway



H. G. LAUTER

and the Rapid Transit Company were consolidated. Following the merger the transfer station was abandoned and Mr. Lauter was made dispatcher. In 1907 he was promoted to assistant superintendent under G. E. Miller. When the Chattanooga Railway, the consolidated company, was taken over by E. W. Clark & Company, Philadelphia, Pa., and their associates, Mr. Lauter continued as assistant superintendent and retained that position until his recent appointment as superintendent of transportation.

John A. Ritchie has been elected president of the Fifth Avenue Coach Company and the New York Transportation Company, New York, N. Y., to succeed Richard W. Meade, who becomes chairman of the board of the companies. Mr. Ritchie enters the motor bus field after twenty years of experience in steam railway operation and in municipal rapid transit work. He was formerly connected with the Illinois Central Railroad and more recently with the Interborough Rapid Transit Company as operating statistician.

Thomas F. Murphine has been appointed superintendent of public utilities of the city of Seattle, Wash., to succeed A. L. Valentine, who was removed by Ole Hanson, the newly-elected Mayor. Superintendent Valentine has been in charge of the department since September, 1909, and his term would have expired on Dec. 31, 1918. Mayor Hanson gave as his reason for announcing the appointment of Mr. Murphine that he did not believe that Mr. Valentine was "whole-heartedly for the city and city-owned utilities." Mr. Murphine was assistant attorney general at the time of his new appointment.

H. E. Blain, operating manager of the London General Omnibus Company, the Metropolitan District Railway, the London Electric Railway and other companies in the city of London, England, was the subject of a special letter contributed by Helen H. Hoffman to the New York *Evening World* of April 5. The writer told how Mr. Blain fearlessly tackled the problem of increasing his force with women and how his action proved something more than an interesting experiment. The account was accompanied by a portrait of Mr. Blain and photographs of women ticket collectors and omnibus employees on the lines in London that are under Mr. Blain's direction.

Richard W. Meade, president of the Fifth Avenue Coach Company and the New York Transportation Company, New York, N. Y., has been elected chairman of the board of the companies. Mr. Meade has been president and general manager of the two companies since 1904. He will continue to be actively interested in their direction, the rapid development of the coach company in particular opening up various broad phases of urban transportation to which he will give his attention. Mr. Meade was formerly connected with the Metropolitan Street Railway, New York, now the New York Railways, under President H. H. Vreeland.

G. H. Blaikie, formerly auditor of the Albany (N. Y.) Southern Railroad, is now auditor of the Connecticut Light & Power Company, with general offices at Waterbury, Conn. This is a newly created office with that company and Mr. Blaikie was appointed to the position largely as a result of his record with the Albany Southern Railroad. From April, 1904, to December, 1911, Mr. Blaikie was head bookkeeper and chief clerk of the Consolidated Railway and the Connecticut Company, New Haven, Conn. When the United Electric Light & Water Company began operation on Jan. 1, 1912, at Waterbury, he was offered the position of chief accountant and continued in that capacity until May, 1914, when he was appointed to the Albany Southern Railroad.

J. C. Rockwell has been promoted from manager of the light and power department to general manager of the Manila Electric Railroad & Light Corporation, Manila, P. I. Mr. Rockwell

was graduated in 1904 from Cornell University with the degree of mechanical engineer. Following his graduation he engaged in track construction work. In 1906 he became superintendent of transportation of the Syracuse, Lakeshore & Northern Railroad, Syracuse, N. Y. He was appointed general superintendent in 1909 of the Charleston (W. Va.) Interurban Railroad and the following year was made general manager of the company. In 1911 he joined the operating organization of the J. G. White Management Corporation, New York City, and was assigned to the Manila Electric Railroad & Light Corporation as manager of the light and power department. Mr. Rockwell has been on a visit to the United States and is now returning to Manila.

Lesley C. Paul, who has been connected with the editorial staff of the *ELECTRIC RAILWAY JOURNAL* in the New York office, has been appointed editorial representative of the paper in Chicago, to succeed H. L. Brown, whose acceptance of a position in Government work was noted recently. Mr. Paul was graduated from the civil engineering department of the University of Colorado in 1915, and accepted a position in the field service department of the McGraw Publishing Company, Inc., publishers of the *ELECTRIC RAILWAY JOURNAL* immediately following his graduation. He remained in the field service department until October, 1916, during which time he traveled over a large part of the United States in the interests of the company. He then accepted the position of assistant circulation manager in charge of *ELECTRIC RAILWAY JOURNAL* circulation and continued in that capacity until November, 1917, when he was appointed to the editorial staff of the paper in New York.

W. B. Voth has resigned as manager of the Ogdensburg (N. Y.) Street Railway, the Ogdensburg Power & Light Company, and the Ogdensburg Gas Company, to become manager of the properties at Eau Claire, Wis., operated by the Wisconsin-Minnesota Light & Power Company. Mr. Voth was formerly chief engineer and purchasing agent of the Empire United Railways, Inc., Syracuse, N. Y. Before that he was general superintendent of the electric railway and lighting properties at Sheboygan, Wis. Mr. Voth is a native of Milwaukee. He was graduated from the University of Wisconsin in 1897. After designing, constructing and operating several small hydroelectric plants in his native State, he was appointed resident engineer at Sheboygan in 1904 during the building of a steam station and the reconstruction of the local commercial and street lighting system. After finishing the construction work, Mr. Voth remained to operate the plant as general superintendent. At the same time he acted as consulting engineer for the Greensboro (N. C.) Company, controlled by the same interests. He resigned from these companies in 1914 to

enter the service of the Empire United Railways.

J. W. Welsh, electrical engineer and traffic agent of the Pittsburgh (Pa.) Railways, has been called to Washington, D. C., by A. Merritt Taylor, manager of passenger transportation of the Emergency Fleet Corporation of the United States Shipping Board. Mr. Welsh, who will serve on Mr. Taylor's staff, will assist in providing transportation facilities and abating deficiencies, where such exist, to the various shipyards on the Atlantic and the Pacific coasts. Mr. Welsh became associated with the Pittsburgh Railways in 1906 as assistant electrician. In 1910 he was made electrical engineer and in 1913 took charge of the traffic department. Prior to this time he was employed as an electrical engineer by the National Tube Company, Wheeling, W. Va., and also by the Westinghouse Electric & Manufacturing Company at East Pittsburgh. He was graduated from Wittenberg College in 1900, Harvard University in 1901 and Massa-



J. W. WELSH

chusetts Institute of Technology in 1903. He is a "Fellow" in the American Institute of Electrical Engineers and several years ago served as chairman of the Pittsburgh Section of this organization. Since 1914 he has been chairman of the power generation committee of the American Electric Railway Association and has written many articles for the *ELECTRIC RAILWAY JOURNAL* and other technical papers.

In January the number of delays of more than five minutes' duration to cars of the Public Service Railway, Newark, N. J., exceeded 2200. The company will put warning notices in the cars calling the attention of drivers of all classes of vehicles to the law in regard to impeding traffic and the penalty imposed for violations of the statute. It will also send to the 146 municipalities which it serves cards telling of the movement and asking the co-operation of the police and municipal authorities. Placards have been placed on the front platforms of the company's cars calling the attention of drivers of vehicles to the matter of causing delays to electric railway cars.

## Obituary

John Thomas Funk, general superintendent and claim agent of the Louisville (Ky.) Railway, died on March 20, following an illness of several months. Mr. Funk was born at Jeffersonton, Ky., on April 20, 1854. He entered the service of the old Louisville Street Railway in 1865 as a switch boy. In 1890 Mr. Funk was named a member of the State Constitutional Convention, and aided in drafting the present constitution. He was active in politics for many years, and was a member of the Board of Education, of which he was at one time president.

Richard Ward Baker, aged sixty-eight years, superintendent of outside construction of the Watson-Stillman Company, New York, died on March 24 at his home at Roselle, N. J. He spent his entire business life in the services of the Watson-Stillman Company, the service of which he entered at the age of fourteen. Upon the completion of fifty years' service in 1914, the board of directors of the company celebrated the event by the presentation of a substantial check and an engrossed copy of the resolution setting forth the company's appreciation.

R. W. Blackwell, president of R. W. Blackwell & Company and Johnson & Phillips, cable and electric supply manufacturers, London, England, died in that city on March 29. Mr. Blackwell was born in New York City on Jan. 27, 1858. He was educated at Andover Academy; Princeton, class of 1879, and Columbia Law School, class of 1881. He was associated with R. R. Hazard in the Gramme Electric Company, a combination of all the early electric companies. He was also associated with Mr. Hazard and with W. B. Parsons in the first proposed underground railroad in New York. He was one of the organizers in 1883 of the Bentley-Knight Electric Company, of which he was president. This company built underground and overhead electric railroads in New York, Boston, Providence, Cleveland and a number of other cities. The Bentley-Knight Company was purchased by the Thomson-Houston Electric Company in 1888. Mr. Blackwell then went to England, where he formed the importing and contracting firm of R. W. Blackwell & Company, which built the first electric railways in England and equipped them with American apparatus. In all, some fifty roads were built by the firm, the last important work being the electrification of the London, Brighton & South Coast Railway in order to increase its capacity as a supply line to the war front in France. Both R. W. Blackwell & Company and Johnson & Phillips have been active in furnishing munitions to the British government since the beginning of the war. Mr. Blackwell is survived by his widow, Lillian Rogers Blackwell.

# Construction News

## Franchises

**Bessemer, Ala.**—The Alabama Interurban Corporation has asked the City Council for a franchise to construct a line in Bessemer, in connection with its proposed line from Birmingham to the Warrior River. Thomas L. Cannon, Birmingham, president. (March 23, '18.)

**Newark, N. J.**—The Public Service Railway has asked the City Council of Newark for a franchise to construct an extension of its line in Hamburg Place to the Submarine Boat Corporation's shipyard at Port Newark terminal.

**Lockport, N. Y.**—It is reported that the Niagara River & Eastern Railway will renew its application to the Public Service Commission for the Second District of New York to build a double-track line from Lockport to Niagara Falls. The petition of the company was denied by the commission two years ago. The plans of the company included the acquisition of the Buffalo, Lockport & Eastern Railway and the double-tracking of the line. E. G. Connette, president of the International Railway, was reported interested in the Niagara River & Eastern Railway. (Dec. 9, '16.)

**Dallas, Tex.**—The City Commission of Dallas has granted the second six months extension to the Dallas Railway for beginning construction on the new 30-mile interurban provided for in the franchise given the company last year. The first extension was granted Oct. 1, 1917, and at that time it was tentatively agreed that if war conditions continued other extensions would be granted until financial difficulties in promoting the new interurban could be easily overcome. A second interurban line must be constructed, under the terms of the franchise, when the earnings of the company reach a certain point. The traction company is under \$200,000 bond as a guarantee that the interurban lines will be built.

## Track and Roadway

**Clear Lake Suspended Monorail, Company, Hopland, Cal.**—The government committee has granted the application of the Clear Lake Suspended Monorail Company for the issuance of \$500,000 in bonds for the construction of its proposed line from Hopland to Lakeport. G. L. Hardison, San Francisco, is interested. (March 2, '18.)

**Pacific Electric Railway, Los Angeles, Cal.**—Work has been begun by the

Pacific Electric Railway on the double-tracking of its line from Long Beach to San Pedro.

**United Railroads of San Francisco, San Francisco, Cal.**—Taxed with not affording sufficient transportation to the Union Iron Works, the United Railroads has offered to build a mile of temporary track over Army Street. This, it was agreed, would solve most of the difficulties. Mayor Rolph has asked the engineers of the city and the company to get busy at once and in the meantime the attorneys are to draw up an agreement whereby the city can take over the temporary tracks at their value any time it desires.

**Washington-Virginia Railway, Washington, D. C.**—The construction of an extension from Mount Vernon to Camp Humphrey, 4 miles, is being considered by the Washington-Virginia Railway.

**\*Tamiami Railway, Miami, Fla.**—Work will be begun by the Tamiami Railway on the construction of an electric line between Miami and the Curtiss aviation school, now a government marine aviation camp. The line will be a part of the proposed steam railway between Miami and Fort Myers. J. F. Jaudon, Miami, is interested.

**St. Petersburg-Tampa Railway, St. Petersburg, Fla.**—Work will be begun about May 1, by the St. Petersburg-Tampa Railway on the construction of a 6-mile bridge across Old Tampa Bay in connection with its proposed 20-mile line from St. Petersburg to Tampa. The cost is estimated at \$1,000,000. George S. Gandy, Sr., St. Petersburg, president. (Nov. 24, '17.)

**Frankfort & Shelbyville Traction Company, Shelbyville, Ky.**—The Frankfort & Shelbyville Traction Company, which proposes to construct an electric road between Frankfort and Shelbyville, 20 miles, has placed on the market an issue of \$175,000 cumulative 7 per cent preferred stock, with shares of the par value of \$100. The full issue authorized is \$250,000. Dividends are payable June 1 and Jan. 1. The stock is redeemable on any dividend date after Jan. 1, 1923, at 105 and accrued dividends. The total capitalization of the company is \$500,000. Half of this is common stock. The stated limited liability is \$1,000,000. The money realized from the sale will be used as working capital for the company during the construction period and for part payment of construction work. First mortgage bonds amounting to \$600,000 will be presently issued. The company was inaugurated in 1917 in Kentucky with a ninety-nine-year franchise and no burdensome restrictions. The line will connect the Kentucky Terminal & Traction Company and the Louisville & Interurban Railway Company at Shelbyville, thus affording

through electric passenger and freight service from Lexington and the Bluegrass country to Louisville. A survey of the line is now being made. It is proposed to build the road throughout with rock ballast. Pending the construction of their own power plant the company will purchase power from a near-by central station. The cars will be of the modern interurban type. L. G. Smith, Shelbyville, president. (Dec. 8, '17.)

**Mattawamkeag & Northern Railway, Bangor, Me.**—Application has been made by the Mattawamkeag & Northern Railway to the Public Utilities Commission of Maine for a three years' extension of its charter to construct a line from Mattawamkeag to Millinocket and East Millinocket, 23 miles. George W. Stearns, Millinocket, and Artemus Weatherbee, Lincoln, interested. (Nov. 13, '15.)

**Detroit (Mich.) United Railway.**—An extension will be built by the Detroit United Railway to the Ford plant on the River Rouge.

**Kansas City (Mo.) Railways.**—This company reports that it is rearranging and adding to its tracks at Forty-eighth Street and Harrison yards. The company will construct an extension of its crosstown line from the North Liberty Street terminus to Sugar Creek.

**International Railway, Buffalo, N. Y.**—E. G. Connette, president of the International Railway, recently informed the City Council at a public hearing that the company's line on Bailey Avenue between Genesee Street and Broadway and between Kensington and Delavan Avenues will be completed this year if the company can finance the proposition, which will cost \$260,000.

**Long Island Electric Railway, New York, N. Y.**—Owing to the improvement of Rockaway Turnpike from Hook Creek to Broadway, Lawrence, through service has been discontinued temporarily on the line of the Long Island Electric Railway between Jamaica and Far Rockaway. A new steel bridge is being built over Mott Creek to replace the old bridge.

**Portland Railway, Light & Power Company, Portland, Ore.**—Work will be begun immediately by the Portland Railway, Light & Power Company repairing its tracks on Second Street, between Madison and Flanders Streets.

**Philadelphia, Pa.**—Mayor Smith of Philadelphia on April 4 made a plea to the Government for permission to complete the Frankford elevated line, after a conference at which he received reports from the heads of the city departments giving the status of all public works under construction which are affected by Secretary McAdoo's work-stoppage order. Copies of the reports, together with a detailed account by W. S. Twining, Transit Director, of the work on the elevated line and the necessity for its completion now, were forwarded to the capital-issues committee of the Treasury Department, which has charge of the matter.

**Montreal & Southern Counties Railway, Montreal, Que.**—An agreement has been concluded between the Montreal Tramways Company and the Montreal & Southern Counties Railway, by which a loop will be constructed around the terminal station of the Southern Counties Railway, involving the crossing of the Montreal Tramways Company's lines, to enable a more speedy handling of the cars.

**Charleston-Isle of Palms Railway, Charleston, S. C.**—It is reported that the Charleston-Isle of Palms Railway will construct an extension from the Mount Pleasant ferry wharf to the shipyard site at Remley's Point, 2½ miles.

**Dallas (Tex.) Railway.**—The Dallas Railway, the consolidated street car lines under the Strickland-Hobson service-at-cost franchise, is now carrying forward much improvement work under the provisions of its franchise which authorize the expenditure of \$1,000,000 in betterments and extensions. These include the purchase and installation of many electrically-driven machines designed to save labor and facilitate the work of making repairs and maintaining track and equipment. An electric track drill, an electric spike driver, an electric bonding machine and an electric tie tamper are among the new machines installed. The new tie tamper does the work of twenty men. Gravel is being hauled by electric trains at a cost of 75 cents per cubic yard below the cost of hauling in wagons with teams. Much new equipment has also been purchased and the arrival of the following materials is reported: Twenty carloads of cross ties, twenty carloads of steel rails, one carload of spikes, three carloads of special track material, consisting of frogs, curves, etc. Shipment of the following material is also reported: Thirty carloads of steel rails, forty carloads of cross ties and fifteen carloads of special track material.

**Houston, Richmond & Western Traction Company, Houston, Tex.**—It is reported that the bonds of the Houston, Richmond & Western Traction Company have been sold to Howard Kenyon, Houston, who has the contract for the construction of the company's line from Houston to San Antonio, 186 miles. Ed. Kennedy, Houston, president. (Feb. 16, '18.)

**Bamberger Electric Railroad, Salt Lake City, Utah.**—A report from the Bamberger Electric Railroad states that the company plans many improvements at its Lagoon resort, which include a new \$14,000 merry-go-round, a 1-mile double-racing coaster, new bath houses, concreting of three bath pools and the construction of a mammoth sand beach.

**Seattle (Wash.) Municipal Street Railway.**—C. B. Bagley, Secretary, Board of Public Works, is receiving bids for the furnishing of labor, material, tools and equipment for driving capping and bracing the pile supports for the municipal elevated railway along Railroad Avenue, from Washington Street to Holgate Street. About

200,000 lin.ft. of piling will be required, the bulk of the piling to be untreated. Piers supporting the twelve wooden trusses across the street crossings will be creosoted piling. A station platform with covered shelter and stairways leading to the streets below is provided about every 1000 ft. on the completed railway. The trestle will be 13 ft. wide and 2¾ miles long. The first section will cost about \$30,000 to \$40,000. Other calls for bids will be issued for the trestles and ties as fast as certain stretches of the piling substructure work is completed. The construction of the line will be pushed as rapidly as possible. F. A. Rapp, assistant city engineer, in charge of bridge construction, states that bids for the work will be let in sections. It is expected that line will be completed within six to eight months. The State of Washington recently offered to buy the \$350,000 in bonds issued for the elevated railway line, and the City Council has voted to accept the offer.

### Shops and Buildings

**Gadsden, Bellevue & Lookout Mountain Railway, Gadsden, Ala.**—A report from the Gadsden, Bellevue & Lookout Mountain Railway states that within the next three weeks it expects to construct a new carhouse 50 ft. x 140 ft.

**Pacific Electric Railway, Los Angeles, Cal.**—It is reported that the Pacific Electric Railway contemplates the construction of a new passenger station at San Pedro.

**Boston (Mass.) Elevated Railway.**—Fire on April 7 completely destroyed the wooden section of the Clarendon Hill carhouse of the Boston Elevated Railway, located in West Somerville, together with thirty-five open cars and five of the semi-convertible type, sixteen snowplows and thirty-five box cars. The loss is estimated at about \$250,000.

**Kansas City (Mo.) Railways.**—A report from the Kansas City Railways states that the company is constructing an addition to its carhouse at Forty-eighth and Harrison Streets, 75 ft. x 114 ft., to be used as a shelter for car repairs.

**Hocking-Sunday Creek Traction Company, Nelsonville, Ohio.**—This company reports that it expects to construct a new carhouse.

**Philadelphia & West Chester Traction Company, Upper Darby, Pa.**—A new freight and passenger station will be built by the Philadelphia & West Chester Traction Company at Gay and Walnut Streets, West Chester.

**Montreal & Southern Counties Railway, Montreal, Que.**—A new passenger and freight station will be built by the Montreal & Southern Counties Railway on Youville Street. The building will be three stories, constructed of steel, concrete and pressed brick.

### Power Houses and Substations

**New York, New Haven & Hartford Railroad, New Haven, Conn.**—A contract has been awarded by the New York, New Haven & Hartford Railroad to C. W. Murdock, New Haven, for the construction of a one-story electric battery building, about 20 ft. x 140 ft., at Dover, near Boston.

**Maryland Electric Railways, Annapolis, Md.**—A contract has been awarded by the Maryland Electric Railways to the Cogswell-Koether Company, Baltimore, for the construction of a new two-story brick substation at Linthicum Heights.

**Kansas City (Mo.) Railways.**—A report from the Kansas City Railways states that the company has purchased twenty underfeed stokers, two boiler feed pumps, one locomotive crane and one feed water heater.

**Southern Public Utilities Company, Charlotte, N. C.**—The Southern Public Utilities Company contemplates increasing the generating capacity of its power plant.

**Hocking-Sunday Creek Traction Company, Nelsonville, Ohio.**—A report from the Hocking-Sunday Creek Traction Company states that it has purchased a large rotary converter set to be delivered this month. A new substation will be built by the company.

**Lehigh Valley Transit Company, Allentown, Pa.**—An order has been placed with the General Electric Company, Schenectady, N. Y., by the Lehigh Valley Transit Company for a style A interlocking machine to be installed at Easton, Pa.

**Charleston Consolidated Railway & Lighting Company, Charleston, S. C.**—A new 500-kw. rotary substation is being built by the Charleston Consolidated Railway & Lighting Company near the navy yard for the purpose of supplying direct current to the suburban railway.

**Puget Sound Traction, Light & Power Company, Seattle, Wash.**—Plans are being prepared by the Puget Sound Traction, Light & Power Company for the construction of coal bunkers for its coal pulverizing plant at 1316 Western Avenue. The improvement will cost about \$17,000.

**Monongahela Valley Traction Company, Fairmont, W. Va.**—Surveys are being made by the Monongahela Valley Traction Company for the erection of a high-tension transmission line from the Speedway to the new electric power plant at Rivesville.

**Ashland Light, Power & Street Railway, Ashland, Wis.**—Plans are being made by the Ashland Light, Power & Street Railway for the construction of a new hydroelectric plant at Superior Falls, to cost about \$100,000. The L. E. Meyers Company, Chicago, is in charge of the work.



# Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

## Trolley Cord Advancing With High Price of Cotton

Within a Year the Cost Has About Doubled—The Latest Increase—Stocks Low

With the fluctuations in cotton every article using the material to any extent—there are a number in the electric railway line—is affected. This has been going on since the beginning of the war, and to-day the principal raw material of cords of all kinds is going higher. For nearly a year the cost of trolley cord, bell and register cords has been on the upward trend. Within the last twelve months trolley cord, that sold for about 45 cents a pound, has advanced to from 75 cents to 80 cents a pound. The last advance of 8 per cent was made inside of a month.

Manufacturers and sales agents, describing conditions, said cord—trolley, bell and register—which is of a superior quality, to withstand the hard wear and tear of careless and trying usage—was subject to the uneasy and changing situation of cotton. The price is jumping in sympathy with this state of affairs. Wednesday cotton was from 28 to 36 points higher than on the previous day, making a new high record. Manufacturers are therefore obliged to pay stiff figures for their material, and, consequently, to reflect the views of large handlers of trolley cord, another increase in price would not be surprising. Stock is none too plentiful and deliveries are far from prompt.

## Brush-holders Likely to Be Advanced in Price

Additional and Repeated Increased Cost of Castings and High Wages the Cause

A manufacturer of brush-holders who has had the price of his casting advanced 3 cents a pound several times recently, says he is very much inclined to pass this extra cost along to the selling agency and the ultimate consumer. As a brush-holder weighs about 5 lb. the castings price runs into money. Improved machinery for stamping slots, whereby six are stamped at one operation as against one before, has reduced the cost of production slightly; but this is offset by the increase to almost double the wages formerly paid the skilled mechanics employed. Other overhead charges have also added materially to the cost.

In relating these facts the chief of an Eastern railway supply house specializing on brush-holders, and

handling the aforementioned manufacturer's product, stated that under the circumstances an advance in price would be justified and doubtless will be shortly announced. If the producer marks up his goods, added the supply man, the higher figure will naturally be added on the seller's quotation. Deliveries to near-by points were prompt, but were behind to the Middle West, South and New England.

## Car Curtain Specialties Gradually Going Higher

Pantasote to Be Marked Up April 20—Rollers and Metal Fixtures Also Advance

Railway supply men, when asked if an advance in price on the material or accessories or machinery they handle had been made, almost invariably answer "things are about at peak, and can hardly go higher." Notwithstanding this encouraging attitude prices are still going higher particularly where cotton is a basic staple. One of the latest products to advance is car curtain materials. While the preliminary announcement has been sent out to the second line manufacturers and sales agents of an advance in the price on pantasote of 5 per cent, the increase does not become effective until April 20. Agasote, another product of the Pantasote Company, used for car headlining, was marked up 10 per cent within a month. Factory deliveries are fairly good.

Car curtain self-acting spring rollers, inside of a year or so, have gone up 125 per cent, although the last increase was made in January. Several manufacturers of car curtains stated they were not consulted by customers as a rule. The railways, in buying passenger cars, designate the curtain material to be used, whether pantasote, peppercorn or what not, and their choice is mandatory. In fact, as one widely-known concern stated its case, "we would make curtains of calico if they were specified." With the revised cost of pantasote a higher figure will also be established on the above date for car curtains of that material.

Likewise, with the scarcity of tin and the high cost of brass no surprise would be expressed if an increase in the cost of curtain fixtures were to come along. With the past rapid jumps in the price of curtain rollers no one pretends to deny that if a further revision on a higher level were to be forthcoming it would be only in keeping with market tendencies.

## To Prevent Confusion in Government Ordering

Requirements Division Created to Collect All Purchasing Information, With Special Sections for Separate Commodities

A new plan of organization of the War Industries Board has been undertaken, the general purpose of which is to prevent confusion and conflict in the ordering and delivering of supplies and to secure unification of the government's policy in dealing with industrial problems. The essential change involved is the creation of a requirements division to which will be furnished information on all contracts, purchases and deliveries, and to which the supply divisions of the purchasing departments and the Allied Purchasing Commission will as far in advance as possible submit statements of their respective needs.

To take charge of particular problems of supply there have been created special commodity sections, and whatever necessary to handle raw materials or finished products of which there is an actual or threatened shortage or the price and production of which should be controlled new sections will be created by the chairman of the War Industries Board. It is the purpose of the chairman of the War Industries Board to make each of the section heads the sole government agency for dealing with the industry for which his section is responsible.

The chief of the commodity section will study the problem referred to his section and will procure from all available sources, including the supply departments, information and data which will be helpful in the allocation of these requirements. At meetings of the commodity section the allocation of materials or facilities to meet the requirements will be determined.

In addition the commodity sections they will consider from time to time the extent of the existing sources of production, the creation of new facilities, the disclosure—if necessary, the opening up—of additional sources of supply, and the conversion of existing facilities to new uses.

Each commodity section will consider market conditions pertaining to the materials or commodities over which it has jurisdiction and will, where deemed advisable, recommend purchase plans to the several purchasing departments. In cases where it becomes necessary to control an industry in whole or in part by means of allotments, the appropriate section will determine the allotments of materials, commodities and facilities to the several departments of this



government and to its allies, and also the extent to which manufacturers and others, whether serving the civilian population or engaged in the manufacture of war supplies, shall be supplied.

## Asphalt Paving on an Advancing Market

Nearly Every Month Prices Have Been Revised—Still Another Increase Is Expected Shortly

Paving material, used largely in city railway construction work particularly, is reflecting the general tendency of the times by increased cost. Asphalt is one of the most important in this line, and importers of the raw material testify to the uncertainties of the market. The greatest percentage of asphalt comes from the island of Trinidad, one of the West Indies off the north coast of South America. Its production and supply is in the hands of practically a monopoly. The concession is held by an American company, and in discussing conditions this week one of the leading officers said that for some time asphalt had been commanding a higher price, and a further increase could be reasonably anticipated. Scarcity of tonnage for regular shipments, heavy freight charges and absorption for government work is responsible for the shortage and consequent high selling cost.

This authority also stated that last month asphalt had gone up \$2 a ton. It meant where previously \$36 was the price it was now \$38 a ton, in minimum lots of 150 tons, for "hot" asphalt. "Cold" asphalt, in the same quantity, with packages weighed in f.o.b. plant in New Jersey, was \$42 a ton against the former price of \$40. Another increase was expected next month. Asphalt filler, which follows the primary product, is now quoted at \$48 a ton.

## Dumping Cars for Excavation Work in San Francisco

The White Company, Cleveland, Ohio, reports that White 5-ton power dumping cars have been used extensively in the excavation work for the Twin Peaks Tunnel in San Francisco. This tunnel is being constructed for use by the cars of the Municipal Street Railway. In this construction work one White truck, in service twenty months on a sixteen-hour schedule, covered 34,000 miles. Another on the same time ran 35,500 miles. Two others in service ten months, for twenty-four hours a day, registered mileages of 15,000 and 16,000. The dumping trucks were used to haul rock blasted from the tunnel and to bring up supplies. Inside the tunnel mules were employed to haul out the material. Later White trucks with special bodies and flanged wheels for running on rails were substituted for this inside work, in addition to the fleet used for general construction purposes.

## Rolling Stock

Kansas City (Mo.) Railways recently purchased 100 National Pneumatic door-operating equipments.

Sheffield (Ala.) Company is reported as having bought a number of open trail cars from the North Alabama Traction Company, Albany, Ga.

International Railway, Buffalo, N. Y., is reported as having ordered thirty new cars from the G. C. Kuhlman Car Company.

Gadsden, Bellevue & Lookout Railway, Gadsden, Ala., within a month will be in the market for two open ten-bench cars and two closed cars, second-hand.

Brooklyn (N. Y.) Rapid Transit Company has ordered 220 sets of Gould slack adjusters from the Railway Utility Company. These are to be applied to the company's semi-convertible cars having Peckham 14D5 trucks.

Washington Railway & Electric Company, Washington, D. C., has placed an order for twenty-five new cars with the J. G. Brill Company as referred to in the ELECTRIC RAILWAY JOURNAL of March 23.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., has placed an order with the St. Louis Car Company for twenty-five single-truck one-man cars, mention of which appeared in the ELECTRIC RAILWAY JOURNAL of March 30.

Springfield (Mo.) Traction Company's order for twelve new one-man cars, placed with the American Car Company, referred to in the ELECTRIC RAILWAY JOURNAL of March 30, comprises the following specifications:

Number of cars ordered.....	12
Name of road.....	Springfield Traction Co.
Builder of car body.....	American Car Co.
Type of car.....	Double-end safety motor
Seating capacity.....	32
Length over bumpers.....	27 ft. 9½ in.
Length over vestibule.....	26 ft. 9½ in.
Width over all.....	8 ft. 0 in.
Height, rail to trolley base.....	12 ft. 6 in.
Body.....	Semi-steel
Interior trim.....	Cherry
Headlining.....	None (rafter finish)
Roof.....	Arch
Air brakes.....	Westinghouse Traction Brake Co.
Axles.....	J. G. Brill Co.
Bumpers.....	American Car Co.
Car trimmings.....	Dayton Mfg. Co.
Control.....	West. K-63
Curtain fixtures.....	Curtain Supply Co.
Curtain material.....	Pantasote
Destination signs.....	Hunter Illuminated
Door operating mechanism.....	Am. Car Co.
Fenders or wheelguards.....	H. B. Life Guards
Gears and pinions.....	West. Elec. & Mfg. Co.
Hand brakes.....	Am. Car Co. with standard drop brake handle
Heaters.....	Peter Smith
Headlights.....	Golden Glow
Journal boxes.....	J. G. Brill Co.
Lightning arresters.....	West. Elec. & Mfg. Co.
Motors.....	G. E. 506-AN-2
Motors.....	Inside hung
Registers.....	International Register Co.
Sanders.....	Electric Service Supplies Co.
Sash fixtures.....	Dayton Mfg. Co.
Seats, style.....	Waylo light-weight reversible
Seating material.....	Birch, veneer and rattan
Springs.....	J. G. Brill Co.
Step treads.....	Feralun
Trolley catchers or retrievers.....	Electric Service Supplies Co.
Trolley base.....	West. Elec. & Mfg. Co.
Trolley wheels or shoes.....	West. Elec. & Mfg. Co.
Trucks.....	Brill 78-M-1
Ventilators.....	Utility Honeycomb
Wheels.....	24-in. cast spoke

Richland Public Service Company, Mansfield, Ohio, on April, it is reported, took over the property of the Mansfield Public Service & Utility Company, and has placed orders for several new pay-as-you-enter cars. The merger, reports say, was approved by the Ohio Public Utilities Commission.

Hudson & Manhattan Railroad, New York, N. Y., mentioned in last week's ELECTRIC RAILWAY JOURNAL as about to construct a spur or new line from Newark, N. J., to the Port Newark Terminal, the site of the new shipyards, and purchase additional all-steel rolling stock equipment, being under government control, must be officially financed before the plan can be put into effect. In the meantime the proposition is held in abeyance, and as soon as the matter is finally determined the order for cars will be placed and the work pushed to completion on a special rush schedule.

Lehigh Valley Transit Company, Allentown, Pa., recently placed in service twelve new double-truck center-exit and entrance cars built by the J. G. Brill Company, at a cost of \$10,000 each, reference to which was made in the ELECTRIC RAILWAY JOURNAL a year ago. An immediate inquiry was made for a quotation on twenty additional cars of the same type. The figure submitted to the Lehigh Valley Company was \$15,000, which was so surprising that the proposal was withdrawn at once. In normal times such cars cost about \$6,500.

Central Arkansas Railway & Light Corporation, Hot Springs, Ark., which ordered seven new one-man cars, from the American Car Company, St. Louis, Mo., as mentioned in the ELECTRIC RAILWAY JOURNAL of March 30, furnishes the appended specifications:

Number of cars ordered.....	7
Name of road.....	Central Arkansas Railway & Light Corporation
Builder of car body.....	American Car Co.
Type of car.....	Double-end safety motor
Seating capacity.....	32
Length over bumpers.....	27 ft. 9½ in.
Length over vestibule.....	26 ft. 9½ in.
Width over all.....	8 ft. 0 in.
Height, rail to trolley base.....	12 ft. 6 in.
Body.....	Semi-steel
Interior trim.....	Cherry
Headlining.....	None (rafter finish)
Roof.....	Arch
Air brakes.....	General Electric
Axles.....	J. G. Brill Co.
Bumpers.....	American Car Co.
Car trimmings.....	Dayton Mfg. Co.
Control.....	K-63-B
Curtain fixtures.....	Curtain Supply Co.
Curtain material.....	Pantasote
Destination signs.....	Hunter Illuminated
Door operating mechanism.....	Am. Car Co.
Fenders or wheelguards.....	H. B. Life Guards
Gears and pinions.....	General Electric
Hand brakes.....	Am. Car Co. with Pittsburgh drop handle
Heaters.....	Peter Smith
Headlights.....	Golden Glow
Journal boxes.....	J. G. Brill Co.
Lightning arresters.....	General Electric
Motors.....	2 G. E. 258
Motors.....	Inside hung
Registers.....	International Register Co.
Sanders.....	Electric Service Supplies Co.
Sash fixtures.....	Dayton Mfg. Co.
Seats, style.....	Waylo reversible seats
Seating material.....	Birch wood, veneer and rattan
Springs.....	J. G. Brill Co.
Step treads.....	Feralun
Trolley catchers or retrievers.....	Electric Service Supplies Co.
Trolley base.....	General Electric
Trolley wheels or shoes.....	General Electric
Trucks.....	Brill 78-M-1
Ventilators.....	Utility Honeycomb
Wheels.....	24-in. cast spoke

## Trade Notes

H. W. Johns-Manville Company, New York, N. Y., has opened a new branch office at 1015 A Street, Tacoma, Wash. This branch carries a complete stock of asbestos packings, molded and in sheet form, and other well-known Johns-Manville power-plant specialties.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has moved its service department from Amberson Avenue to new quarters at 6905 Susquehanna Avenue, in the Homewood district of the city. Express and freight should be consigned to East Liberty, Pa., via Pennsylvania Railroad.

Railway Improvement Company, New York, announces that it has received an order for Rico Anti-Climbers to take care of the 100 new cars for the Philadelphia Rapid Transit Company's Hog Island service, specifications for which cars were published on page 552 of the ELECTRIC RAILWAY JOURNAL March 16.

Economy Electric Devices Company, Chicago, Ill., has recently sold the Dayton, Springfield & Xenia Southern Railway Company, Dayton, Ohio, Sangamo Economy electric railway meters for use in an energy-saving campaign. These devices will be used on all city and interurban cars of this railway.

W. Nelson Nib Smith, for a number of years electric traction engineer with Westinghouse Church Kerr & Company and recently efficiency engineer for the

American Agricultural Company, has become connected as an electrical engineer with Sidney E. Junkins & Company, engineers and constructors at Vancouver, B. C.

Walter A. Zelnicker Supply Company, St. Louis, Mo., has recently secured the services of G. W. Bichlmeir, formerly connected with the supply departments of the Missouri Pacific and Kansas City Southern Railway companies. Mr. Bichlmeir joins the Zelnicker machinery department.

## New Advertising Literature

George W. Fleming Company, Springfield, Mass.: Illustrated circular descriptive of the company's "Combination Lathe, Boring and Milling Machine."

Diamond Power Specialty Company, Detroit, Mich.: Bulletin No. 119, illustrated in two colors throughout, is a review of current mechanical soot blower practice.

Spray Engineering Company, Boston, Mass.: Bulletin No. 202 describes the Spraco system for cooling condensing water and gives illustrations of some installations.

Ingersoll Rand Company, New York, N. Y.: Booklet describing its products and giving a list of the uses of compressed air. Valuable engineering data and information are also presented in the booklet.

Walter A. Zelnicker Supply Company, St. Louis, Mo.: Bulletins No. 236 listing and describing rails, locomotives, cars, machinery and other railway equipment and material.

tives, cars, machinery and other railway equipment and material.

Economy Electric Devices Company, Chicago, Ill.: Bulletin No. 50 describes construction of Economy meters and advantages to be derived from checking energy used in car operation.

Automatic Reclosing Circuit Breaker Company, Columbus, Ohio: Bulletin No. 30, illustrated, entitled "Automatic Reclosing Circuit Breakers and Relays" for the protection of direct-current circuits—general description, theory and application.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.: Bulletin entitled "The Further Prospect of Railroad Electrification." A discussion of the cost and advantages of railroad electrification is made in the bulletin.

Otis Elevator Company, New York, N. Y.: A bulletin referring to its skip hoists, which are automatically operated. Different types of skip hoists, their layout, and some typical installations in manufacturing plants, coal and coke plants, gas, electric light and power stations are shown.

Westinghouse Traction Brake Company, Pittsburgh, Pa.: The industrial department has issued an illustrated, copyrighted 6-in. x 9-in. booklet, designated as publication No. 9035, 113 pages, describing in detail its complete line of motor-driven compressors, both stationary and portable installations, ranging in capacities from 11 to 110 cu. ft. Compressed air accessories for doing almost every possible job of work are included.

## NEW YORK METAL MARKET PRICES

	April 3	April 10
Copper, ingots, cents per lb.	23½	23½
Copper wire base, cents per lb.	26½ to 26½	26½ to 26½
Lead, cents per lb.	7.20	7
Nickel, cents per lb.	50	50
Spelter, cents per lb.	7½	7
Tin, Straits, cents per lb.	*85	*85
Aluminum, 98 to 99 per cent, cents per lb.	†32.10	†32.10

\* Nominal. † Government price in 50-ton lots, f.o.b. plant.

## OLD METAL PRICES—NEW YORK

	April 3	April 10
Heavy copper, cents per lb.	22	22
Light copper, cents per lb.	19½	19½
Red brass, cents per lb.	18	18
Yellow brass, cents per lb.	13	13
Lead, heavy, cents per lb.	6½	6½
Zinc, cents per lb.	5½	5½
Steel car axles, Chicago, per net ton.	\$42.41	\$41.52
Old car wheels, Chicago, per gross ton.	\$30.00	\$29.00
Steel rails (scrap), Chicago, per gross ton	\$35.00	\$34.00
Steel rails (relaying), Chicago, gross ton	\$60.00	\$60.00
Machine shop turnings, Chicago, net ton	\$17.00	\$16.50

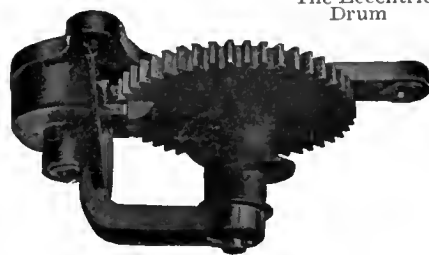
## ELECTRIC RAILWAY MATERIAL PRICES

	April 3	April 10
Rubber-covered wire base, New York, cents per lb.	27 to 30	30
Weatherproof wire (100 lb. lots), cents per lb., New York	28½ to 34½	28½ to 34½
Weatherproof wire (100 lb. lots), cents per lb., Chicago	33.42 to 38.35	33.42 to 38.35
T-rails (A. S. C. E. standard), per gross ton	\$70.00 to \$80.00	\$70.00 to \$80.00
T-rails, high (Shanghai), cents per lb.	4½	4½
Rails, girder (grooved), cents per lb.	4½	4½
Wire nails, Pittsburgh, cents per lb.	3½	3½
Railroad spikes, drive, Pittsburgh base, cents per lb.	4½	4½
Railroad spikes, screw, Pittsburgh base, cents per lb.	8	8
Tie plates (flat type), cents per lb.	*3½	*3½
Tie plates (brace type), cents per lb.	*3½	*3½
Tie rods, Pittsburgh base, cents per lb.	8	8
Fish plates, cents per lb.	*3½	*3½
Angle plates, cents per lb.	*3½	*3½
Angle bars, cents per lb.	*3½	*3½
Rail bolts and nuts, Pittsburgh base, cents per lb.	4.90	4.90
Steel bars, Pittsburgh, cents per lb.	5	5
Sheet iron, black (24 gage), Pittsburgh, cents per lb.	4.90	4.90
Sheet iron, galvanized (24 gage), Pittsburgh, cents per lb.	5.80	5.80
Galvanized barbed wire, Pittsburgh, cents per lb.	4.35	4.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.	3.95	3.95

	April 3	April 10
Car window glass (single strength), first three brackets, A quality, New York, discount	80% to 82-3%	80% to 82-3%
Car window glass (single strength, first three brackets, B quality), New York, discount	79%	79%
Car window glass (double strength, all sizes AA quality), New York, discount	80%	80%
Waste, wool (according to grade), cents per lb.	11½ to 22	11½ to 22
Waste, cotton (100 lb. bale), cents per lb.	12½ to 13	12½ to 13
Asphalt, hot (150 tons minimum), per ton, delivered	\$38	\$38
Asphalt, cold (150 tons minimum, pkgs. weighed in, F. O. B. plant, Maurer, N. J.), per ton	\$42	\$42
Asphalt filler, per ton	\$45	\$45
Cement (carload lots), New York, per bbl.	\$2.65	\$2.65
Cement (carload lots), Chicago, per bbl.	\$2.71	\$2.71
Cement (carload lots), Seattle, per bbl.	\$3.05	\$3.05
Linseed oil (raw, 5 bbl. lots), New York, per gal.	\$1.59	\$1.59
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	\$1.60	\$1.60
White lead (100 lb. keg), New York, cents per lb.	10	10
Turpentine (bbl. lots), New York, cents per gal.	42½	41

\* Government price.

# Peacock Brakes



The Eccentric  
Drum

## *Are Graduated to Stop Without Lock or Shock*

There is a wide, wide difference between scotching and braking a vehicle.

Just to clamp a shoe or scotch-block against a wheel is easy enough.

But to do it so gradually, yet so powerfully, that the wheels won't lock is to have a real brake.

A locked or skidding wheel is, of course, both noisy and dangerous.

For this reason we design and proportion Peacock brakes to meet best the user's individual combination of car weight (empty and loaded), grades, speed, truck design and other factors.

When you are ready to replace your present brakes or to order brakes for new cars, we shall be glad to consult with you on selecting the brakes that will give the best results for the least outlay.

## National Brake Company

Buffalo, N. Y.

# Bankers and Engineers



## STONE & WEBSTER

Industrial Plants and Buildings, Steam Power Stations,  
Water Power Developments, Substations, Gas Plants,  
Transmission Lines, Electric and Steam Railroad Work.  
NEW YORK BOSTON CHICAGO

## THE J. G. WHITE COMPANIES

ENGINEERS  CONTRACTORS  
FINANCIERS OPERATORS  
43 EXCHANGE PLACE . . . . NEW YORK  
LONDON CHICAGO

## SANDERSON & PORTER ENGINEERS

REPORTS • DESIGNS • CONSTRUCTION • MANAGEMENT  
HYDRO-ELECTRIC DEVELOPMENTS  
RAILWAY, LIGHT AND POWER PROPERTIES  
CHICAGO NEW YORK SAN FRANCISCO

## WOODMANSEE & DAVIDSON ENGINEERING CO.

## ENGINEERS

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ENGINEERS—CONSTRUCTORS  
ELECTRICAL—CIVIL—MECHANICAL  
108 SOUTH LA SALLE STREET  
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## H. M. Byllesby & Company, Inc.

NEW YORK CHICAGO TACOMA  
Trinity Bldg. No. 208 So. La Salle St. Washington  
Purchase, Finance, Construct and Operate Electric Light,  
Gas, Street Railway and Water Power Properties.  
Examination and reports. Utility Securities Bought and Sold.

ALBERT S. RICHEY  
ELECTRIC RAILWAY ENGINEER  
WORCESTER POLYTECHNIC INSTITUTE  
WORCESTER, MASSACHUSETTS

## D. C. & WM. B. JACKSON ENGINEERS

CHICAGO BOSTON  
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Plans, Specifications, Supervision of Construction  
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Examinations and Reports  
Financial Investigations and Rate Adjustments

## JOHN A. BEELER

OPERATING AND RATE INVESTIGATIONS  
TRAFFIC SURVEYS AND SCHEDULES  
52. ELECTRIC RAILWAY MANAGEMENT 343  
VANDERBILT SUPERVISION OF CONSTRUCTION District Bldg.  
AVE. ENGINEERING Washington,  
NEW YORK APPRAISALS D. C.

## Ford, Bacon & Davis, Engineers.

115 BROADWAY  
New Orleans NEW YORK San Francisco

## Sloan, Huddle, Feustel & Freeman Consulting Engineers

Analytical Studies of financial and operating conditions,  
appraisals and rate adjustments of electric railway and  
all public utility properties.

BOSTON, 14 Kilby Street CHICAGO, Conway Bldg.

## THE P. EDW. WISCH SERVICE

Suite 1710 DETECTIVES Suite 715  
Park Row Bldg., New York Board of Trade Bldg., Boston

## ELECTRICAL TESTING LABORATORIES

Electrical, Photometrical and  
Mechanical Testing.  
80th Street and East End Ave., New York, N. Y.

When writing the advertiser for information or prices, a men-  
tion of the Electric Railway Journal would be appreciated.

Scotfield Engineering Co. Consulting Engineers  
PHILADELPHIA, PA.  
POWER STATIONS GAS WORKS  
HYDRAULIC DEVELOPMENTS ELECTRIC RAILWAYS

The results of the best practice in electric railway work  
are recorded every week in the Electric Railway Journal

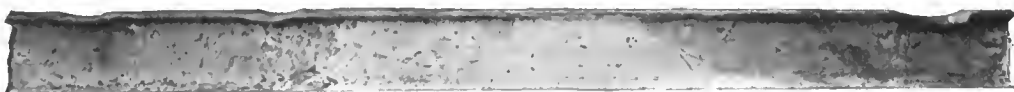


## Here is a Demonstration

The mechanical tie shown in this illustration was modeled in concrete for open track use.



It was placed in the tracks of the Dayton, Springfield & Xenia Southern Railway at a point where it would be subjected to the most severe use. Heavy cars at high speed have hammered this tie for **Six Years**. Its condition shows plainly—it's as good as when it was installed.



The 6-in. steel I-beam, shown here, has been in use for **Five Years** under a cross-over near a railroad crossing, where all cars run at reduced speed. It is merely **one** of a number similarly dented and hammered.

**Just Study the Pictures**

Then write us for further details.



**THE DAYTON MECHANICAL TIE CO.**

201 Third Street Arcade

DAYTON, OHIO





# Have it sent to your home Why?

## Electric Railway Journal's service is of permanent value

Every issue contains articles for which you may have no immediate use. You read them—they interest you—you store away their salient points in some crowded corner of your brain—and straightway forget them.

## By and by occasions will arise

when you would give your head to be able to lay your hands quickly upon something you remember to have read in the Journal—not merely the high spots, but the detailed facts and figures.

## If it's all your very OWN copy

you will read it regularly, and what you want is always at your service. If it's the Company's copy you are reading, after that first hurried perusal it is gone for good.

## To get 100% efficiency out of your Journal

you must have your own individual copy—with no one else to share it with you or to mark or cut it up for you. You must have it sent to YOUR HOME, where you can have it all to yourself, where you can read it at your leisure, where you know where to find it when the hurry calls come for data of importance which you can get from no other source.

## THIS YEAR

will witness many strides toward the permanent settlement of many of the burning questions now agitating the industry. These developments will leave their mark upon the common practice for years to come. You will want to refer to them repeatedly long after the present transition period is over. Beginnings are always interesting. The beginnings of many of the movements now in the bud are unusually so. They spell REVOLUTION all over—they forecast the entire reshaping of electric railway practice—many of their elements that now appear to be of minor import will hereafter be regarded of weighty consequence.

**Get them all—get them for yourself  
Get them permanently—get them at your home**

TEAR OFF HERE

Electric Railway Journal, 10th Ave. at 36th St., New York, N. Y.

Enter my subscription for one year to the Electric Railway Journal. I will remit \$3 in 30 days.

Name.....

Address.....

Company.....Position.....

(In Canada the price is \$4.50. Foreign rate, \$6)

YOC-2

## THIS COUPON

will insure them to you in the way they will be of the greatest service to you. Never mind the money now—simply fill in and mail the coupon at once—

**TODAY**



**Saves**  
**\$100.00**  
**a Day**  
*for Every Day*  
*it is used!*  
*That's what the*

## Indianapolis Portable Electric Welder *has been doing for several years past!*

This saving of \$100 a day is not an advertising phrase of ours, evolved to catch your eye, but it is the *practical experience* of railroads using our welding equipment.



The first cost of the equipment is paid for inside of 60 days—and the operating costs, including labor, current and steel, amount to only 1% to 2% of the value of the reclamation.

**Indianapolis Switch & Frog Company, Springfield, Ohio**

# The Track Superintendent says:

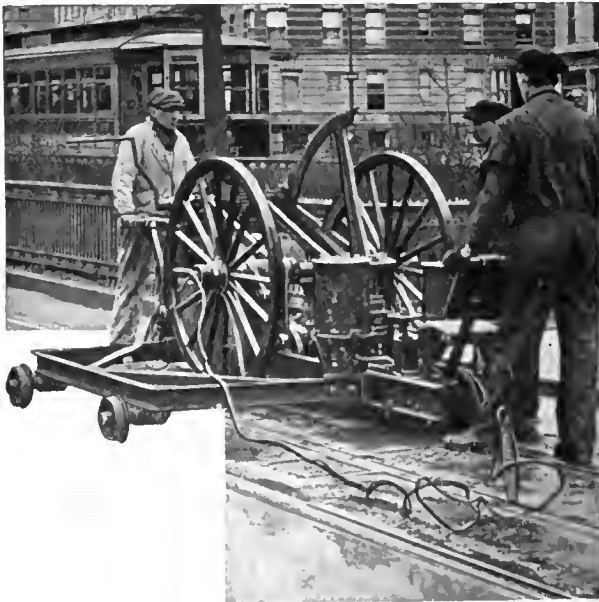
In  
Eight  
Months  
a  
Wreck

Differences in height of rails at joints must be removed immediately to conserve the life of the joint. Practice has demonstrated this very forcibly within the last eight years, and I will mention one particular instance out of many where the issue was brought to my attention. Two pairs of compromise splices were installed of the Atlas type where 70-lb. A. S. C. E. rails were connected to 97-lb. 424 grooved section. At the time of installation in 1913 a very slight difference in the surface of the rails was noticed, and we neglected to grind the rails to a smooth surface. This was a single track over which 26-ton cars operated on from a headway of from three to four minutes. Inside of eight months these joints were a wreck, including paving and rail ends. In order to repair them, new Atlas plates were installed, new pieces of rails were cut in, and the joints were then ground to a true surface. After more than two years these joints are apparently as perfect as on the day they were installed. We find this to be particularly true on compromise joints at special work.

After  
TWO  
YEARS  
Still  
Perfect

*From a report of the track superintendent of a large electric railway*

## The Reciprocating Track Grinder



if put to work promptly upon the early appearance of corrugations or cupped joints, means a big eventual saving in time and cost of grinding and eliminates the necessity of grinding away so much of the wearing surface of the rail as would be necessary if the indentations are allowed to become deep.

And don't forget that merely because track is new is no sign that these "leaks" in track efficiency will not develop. It has been clearly shown that serious corrugation may show in track which has not been in service a month.

Trying to save expense by delaying track grinding until it becomes an absolute necessity is like trying to save money and trouble by delaying a visit to the dentist until the tooth begins to ache.

We are ready to prove the efficiency of Reciprocating Track Grinders on your own tracks without any risk to you.

## Railway Track-work Company

30th and Walnut Streets, Philadelphia

AGENTS: Holden & White, Inc., 343 S. Dearborn St., Chicago. Wilmore, Hall & Co., Pacific Electric Bldg., Los Angeles, Cal.

# How Johnson Fare Boxes and Metal Tickets

## Protect the Honest Conductor

When you employ a man to handle your cash, your first duty is to make it easy for him to give an accounting that can't be misunderstood or disputed.

That's what the Mobile Light & Railroad Co. does through its use of the Johnson (four-cyclometer) Fare Box and Metal Tickets.

As each class of fare (cash—cash ticket—commutation—passes) is recorded by the Johnson, it's double-checked by ringing up on the money side of a register within. Transfers are also rung up on the transfer side of the register.

It's no trouble for the conductor to make out a correct "Daily Fare Box and Register Report." It's no trouble for the inspector to see that fare box and register are working in harmony.



MOBILE LIGHT AND RAILROAD COMPANY									
DAILY FARE BOX AND REGISTER REPORT									
Date	191	Line	Run No.	Car No.					
NAME OF CONDUCTOR	TIME	A. M. OR P. M.	FARE BOX NUMBER	FARE BOX READINGS				REGISTER READINGS	
				CASH FARES	TICKETS	PASSES	TOTAL	FARES	TRANSFERS
Report of Register Taker		M	Out at						
		M	Taken at						
		M	Left at						
		M	Taken at						
		M	Left at						
		M	Taken at						
		M	Left at						
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		M	Left at						
		M	Taken at						
		M	Left at						
		M	Taken at						
		M	Left at						
Report of Register Taker		M	In at						

As conductors are strictly ordered to have each passenger deposit his own fare, violation of the rule would be proof positive of dishonest intent. But

Since Johnson Fare Boxes and Johnson Metal Tickets have been installed not one such violation has been noted.

## The Johnson System Will Help You Hold Good Men

### JOHNSON FARE BOX COMPANY

Jackson Boulevard and Robey St., Chicago

50 East 42nd Street, New York

# Be More Efficient!

That's what  
America asks  
of all the  
Industries.

**T**O PLACE a Lincoln Bonder on a Ford car, is as great an improvement as putting a machine gun on the back of a soldier. The bonder itself is good enough—so is the magazine rifle. But the combination of Lincoln and Ford puts the speed of a motor car at the disposal of the *emergency welder*—without requisitioning the big "trouble wagon."



## THE LINCOLN BONDING CO.

636 Huron Rd., Cleveland, Ohio

### AGENTS:

**BOSTON**  
Chas. N. Wood Co.  
**NEW YORK**  
Atlantic Welding Co.  
**PHILADELPHIA**  
Railway Track-work Co.

**PITTSBURGH**  
Electrical Engineering &  
Manufacturing Co.

**CHICAGO**  
Holden & White, Inc.

**ST. LOUIS**  
W. L. Rose Equip. Co.  
**MILWAUKEE**  
W. C. Burdick  
**LOS ANGELES**  
Wigmore, Hall & Co.

CANADA: Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg



Since 1903 Carnegie Steel Company has been engaged in the manufacture of

## Steel Cross Ties

for steam and electric railway service, industrial track, etc.

It has given to the development of steel cross ties the skill gained by years of experience in their manufacture, and on the basis of that experience recommends steel tie construction for street railway track in paved city streets of the highest class where economy in ultimate expenditure may be secured and where the necessity for renewals and repairs should be reduced to a minimum.

The illustrations show steel cross ties installed on Euclid Avenue, Cleveland, Ohio.

## Carnegie Steel Company

General Offices—Pittsburgh, Pa.



# JOHNS-MANVILLE TRANSITE ASBESTOS WOOD

To be used in place of wood wherever fire is a menace.



Oil Switch Doors  
Pacific Gas & Electric Co., San Francisco, Cal.

That is the easiest way to tell the story of Johns-Manville Transite Asbestos Wood. For like wood it is structurally strong and like wood it may be cut and sawed and painted or varnished. But unlike wood it is not a fire risk nor does it deteriorate.

Johns-Manville Transite Asbestos Wood is heat-resisting, fire and weather proof; and because it is fibrous in structure, it is not liable to crack, and because mineral asbestos fibres do not individually absorb moisture, it is not liable to warp.

This material is desirable in every way for bus-bar and high-tension switch compartments and doors, as well as for the building of ducts and conduits. In building construction its uses are unlimited. Ask the nearest branch for booklets.

H. W. JOHNS-MANVILLE CO.  
NEW YORK CITY

10 Factories—Branches in 61 Large Cities



# JOHNS-MANVILLE



*“Van Dorn”*  
GEARING  
Motor Gears & Pinions

## Consistent in Performance

You who've had experience with ordinary gearing breaking down on the curves or on the grades, or under heavy loading, will appreciate the consistent performance of "Van Dorn" gears under these conditions.

They're as consistent in quality as in service, too.

The caution with which the raw materials are selected is only equalled by the care used in their machining, cutting and hardening or treating.

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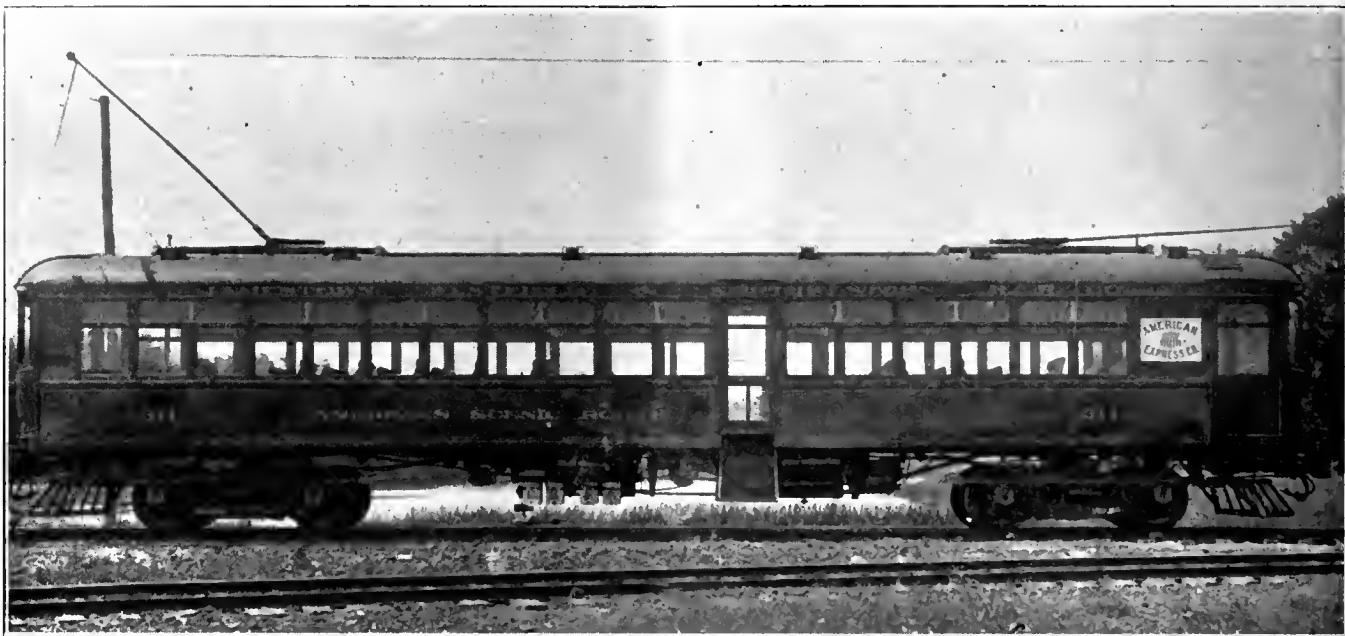


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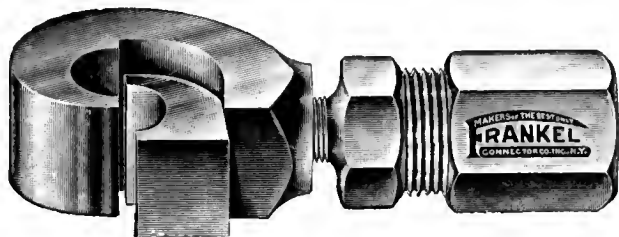
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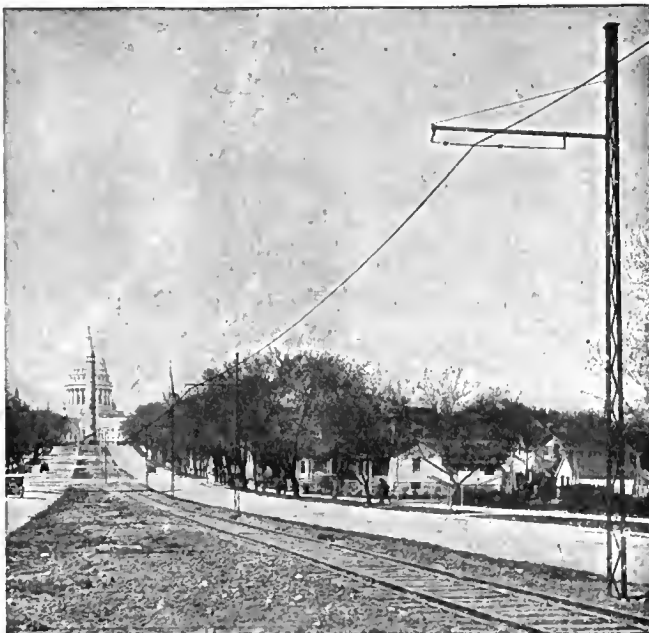
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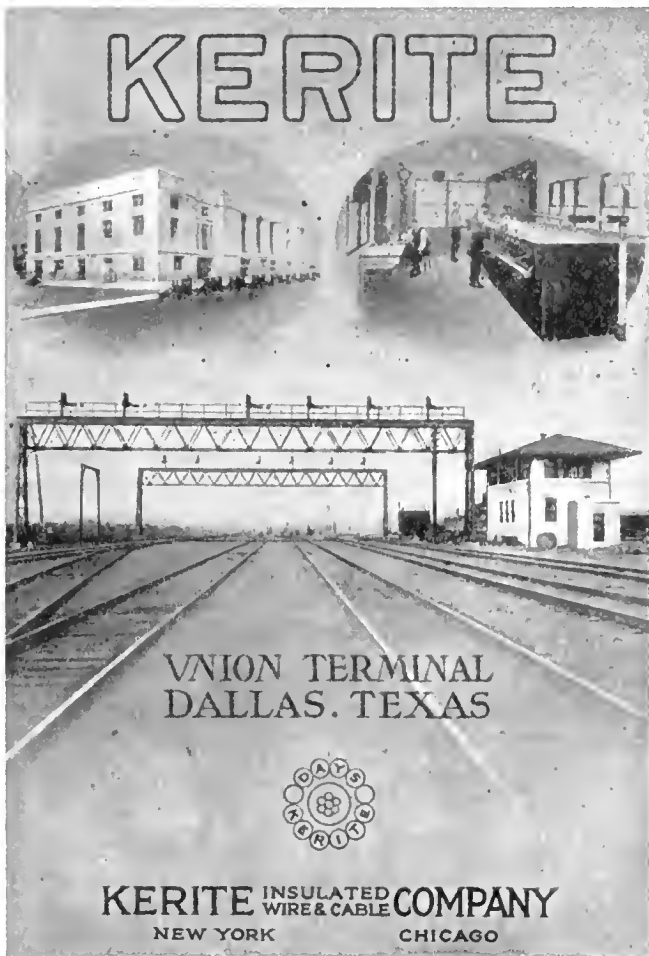
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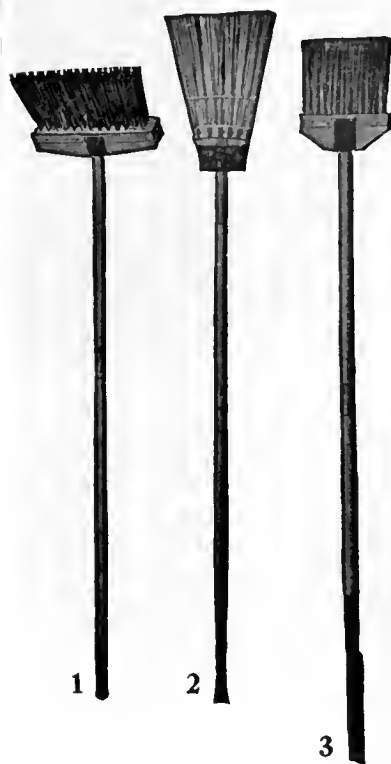
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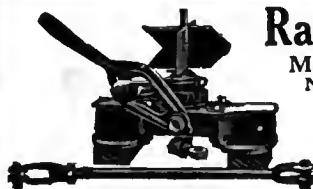


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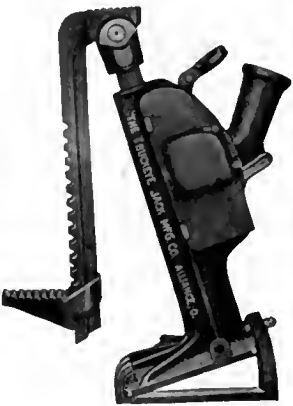
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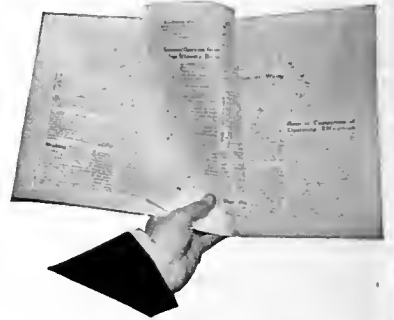
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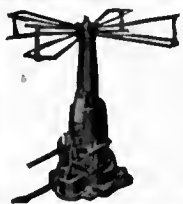
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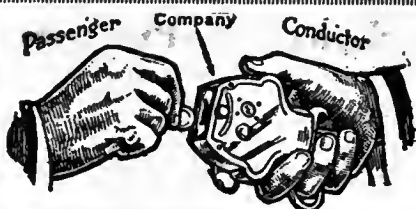
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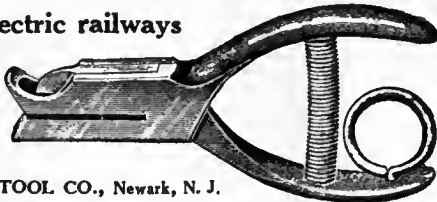
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#### TRANSIT EQUIPMENT COMPANY

501 Fifth Avenue, New York

### Complete Power Plant

#### Delivery Approx. May 1st

2—780 KVA. Westg. Turbo Outfit, 3-ph., 60-cy., 2400-V., 3600 R.P.M., complete with switchboards and exciter units; also condensing apparatus. 4-338 H.P. Keeler Water Tube Boilers with breeching, attack, pumps feed water besters, piping, etc.

#### TURBINES

1—2500 KVA. Gen. Elec. Curtis Horz. Turbo Outfit, 2-ph., 60-cy., 2300-V., 3600 R.P.M., 150 lb. steam pressure, with Westg. Le Blanc Condenser.  
1—500 Kw. Gen. Elec. Curtis Turbo Outfit, 3-ph., 60-cy., 2300-V., 1800 R.P.M., 150-lb. steam pressure. Vert. type.  
1—500 Kw. Westg. Horz., 3-ph., 60-cy., 360-V., 3600 R.P.M. Turbo Outfit.  
1—100 Kw., Gen. Elec. Turbo Outfit, 3-ph., 60-cy., 2300-V., 3600 R.P.M., 125-lb. steam pressure.

#### ARCHER & BALDWIN, Inc.

114-118 Liberty St., New York, N. Y. Telephone 4337-4338 Rector.

#### FOR SALE

##### Generator For Sale

500 KW 550 volt compound wound Westinghouse Generator belted to Corliss Engine. In first class condition. A. Werby & Co., 47 Beverly St., Boston, Mass.

#### POSITIONS VACANT

CAR house foremen wanted, night, two. Good pay to start and excellent opportunity for advancement. Maryland location—Locations vacant operate about 50 cars with G. E. and West. equipment. P-117, Elec. Ry. Journal, Philadelphia.

COMMISSION man to sell Red Cedar Piling and Poles wanted. State experience. P-115, Elec. Ry. Journal, San Francisco.

DRAFTSMAN wanted for master mechanic's office. Must have a fair knowledge of mechanical and electrical work. State age, nationality and salary expected in first letter. An exceptionally good opportunity for right party. P-93, Elec. Ry. Journal, Philadelphia.

#### POSITIONS VACANT

EXPERIENCED shop and car house electric railway repairman wanted. Good wages at start with excellent chance for advancement. Large Railway Company located Middle East. P-118, Elec. Ry. Journal, Philadelphia.

COST clerk, engineering department of railway company desires one familiar with operating and construction costs. Draft exempt. State education and experience. Salary \$125 month. P-128, Elec. Ry. Journal.

#### INSPECTORS WANTED

for operation of city cars on a Northern property. Salary to start \$110.00 per month. Give experience, age, etc.

P97—Elec. Ry. Journal, Leader-News Bldg., Cleveland, Ohio.

#### POSITIONS VACANT

OFFICE man wanted, experienced and reliable, to handle general office work for a commercial company located in New York City which deals exclusively with Street Railways. Prefer man 30 to 35 who is familiar with the best methods of banking, bookkeeping and the handling of materials and supplies. Right party will be given plenty of chance for advancement and an interest in the company if agreeable. References required. P-119, Elec. Ry. Journal.

TRACK foreman wanted—Good live man to take charge seventeen miles of track and special work, city and interurban. One who can handle men with results. State wages and give references. P-126, Elec. Ry. Journal, Chicago.

## RAILS

### RELAYERS—NEW

Write, wire or phone us if you need any. 8 lb. to 100 lb. section.

GENERAL EQUIPMENT CO.  
30 Church Street, New York City

## RAILS

### RELAYERS—NEW

If you have any to sell, 12 lb. to 100 lb., write, wire or phone us.

GENERAL EQUIPMENT CO.  
30 Church Street, New York City

### 85 lb. A. S. C. E. Relayers

16,000 tons—with Angle Bars to match. Available immediate shipment and centrally located.

We positively own these Rails and offer same in carload lots and over.

25,000 tons—Relayers—sizes 25 lb. to 100 lb. in stock our Pittsburgh yards and vicinity.

Immediate shipment guaranteed and prices very attractive.

Carload and less than carload inquiries and orders solicited.

Rails cut to length for structural purposes. Frogs, Switches, Bolts, Nuts, Spikes and all Accessories.

L. B. FOSTER COMPANY  
Park Building, Pittsburgh, Pa.

## CAR BARGAINS

OPEN and CLOSED  
MOTOR and TRAIL

Write for Price and Full  
Particulars to

ELECTRIC  
EQUIPMENT CO.  
601 Commonwealth Bldg. Phila. Pa.

## Direct Current Belted Generator

1—500-kw., 550-V., 320 r.p.m.,  
Cp. Wd. Westinghouse 3 bearing  
direct current generator.

DUQUESNE  
Electric & Mfg. Co.

Bessemer Bldg., Pittsburgh

## CLEVELAND ARMATURE WORKS

Cleveland, Ohio

### Everything in the Line of Repairs to Electrical Machinery

Complete Armatures, New Armatures,  
Rewound Armature Cores, Armature  
Shafts, Armature Coils, Fields and  
Commutators.

Established 22 Years.

# SEARCHLIGHT SECTION

Miscellaneous



## Rotary Converters

60 Cycle—600 Volts

- 1—400-Kw. General Electric Rotary Converter, type HC, 6-phase, 60-cycle, 600-volts D. C., 8 pole, 900 r.p.m., with switchboard equipment.
- 1—300-Kw. Westinghouse Rotary Converter, 6-phase, 60-cycle, 600 volts D. C., 6 pole, 1200 rpm., with one 300 Kva. Westinghouse 3-phase transformer, 13,200 volts primary, complete with switchboard equipment.

## CAR MOTORS

- 10—Westinghouse No. 306 Railway Motors.

*We shall be glad to mail complete list of Electrical, Steam and Hydraulic Machinery upon request.*

**MACGOVERN & COMPANY, INC.**  
114 Liberty Street New York, N. Y.

## Turn Your Scrap Into Cash

It's the patriotic as well as the economic duty of manufacturers to prevent waste of metals. Tell your men today to ship us all your car brasses, scrap copper and miscellaneous brasses.

We will pay you full value for any quantity. Quotations upon request. We are the largest smelters, refiners and manufacturers in the world of non-ferrous metals.

*We pay full market prices.*

**THE AJAX METAL COMPANY**

Established 1880

Main Office and Works  
Philadelphia, Pa.

Southern Plant  
Birmingham, Ala.



**METAL COMPANY**

## Motor Generator Set Wanted

One 300-kilowatt motor generator set, 2200-volt, 3-Phase, 60-Cycle. Synchronous Motor and 600-Volt D. C. Generator.

**THE HAGERSTOWN & FREDERICK RY. CO.**  
Frederick, Md.

## Rails

- 100 tons 7-in., 70-lb., Shanghai Re-layers.
  - 300 tons 85-lb. Relay. *Good as new.*
  - 125 tons 9-in., 90-lb. Girder Rails.
  - 500 tons 100-lb., with angles. *New.*
- Full Stock, All Weights.*

## Interurban Cars

- 1—Combination, 38-ft. over platforms, 28 ft. inside. Passenger compartment 20 ft., baggage compartment 8 ft., seating capacity 36. Four GE-1000 motors. Double end control.
- 1—Passenger, 38-ft. over platforms. Seating capacity 42. Two GE-1200 motors. Double end control.

*Both in First-Class Condition.*

**ZELNICKER IN ST. LOUIS**  
GET BULLETIN 237—70 BARGAIN PAGES.

## EQUIPMENT FOR SALE

2 Worthington Duplex

## Boiler Feed Pumps

outside packed pot valve. Size 10 x 6 x 10 in.

2 Sprague Electric Push Button

## Control Boards

for 77-hp. motors, 240-volt D.C., with circuit breakers.

3 Sprague Electric Control Boards, 45-hp. motors, 240-volt D.C., with circuit breakers.

2 Thomson

## Watt Meters

800 Amp., 240-volt D.C., 2-wire

*Purchasing Dept.*

**MCGRAW-HILL COMPANY**  
10th Ave. at 36th St., New York

## WATER-TUBE BOILERS

1700-HP.

*For Immediate Delivery*

- 3—300-hp. Wickes Boilers.
  - 2—400-hp. Wickes Boilers.
- Equipped with Murphy Stokers and separate smoke stacks; 150-lb. steam pressure.

Fine, modern, economical plant.  
Low Price.

**WICKES MACHINERY CO.**  
Jersey City, N. J.

FOR SALE

## BRACE TIE PLATES

1000 brace tie plates for Lorain Steel Co.'s section 70-264 tee rail. New. In original bundles.

**NORTHERN STATES POWER CO.**  
Fargo, N. D.

## ROTARY CONVERTERS

FOR SALE—IMMEDIATE DELIVERY

Two 200 Kw. 25 Cycle, 600 Volt, General Electric Rotary Converters. Each complete with Three General Electric 13,200 Volt, 75 Kw. Transformers.

**Northwestern Pennsylvania Railway Co.**  
Erie, Pa.

*Get your Wants  
into the Searchlight*

# SEARCHLIGHT SECTION

## Miscellaneous

### POSITIONS WANTED

**ASSISTANT** superintendent or despatcher of transportation department by man with 22 years' experience in transportation work. Good organizer. PW-74, Elec. Ry. Journal, Chicago.

**AUDITOR**, thoroughly capable in public utility accounting, solicits change. Sixteen years' experience, age 39, married, references. PW-73, Elec. Ry. Journal, Cleveland.

**AUDITOR**; 16 years' experience with large interurban and city properties. Employed, solicits change. References from present and past employers. Age 37. Married. PW-108, Elec. Ry. Journal, Chicago.

**AUDITOR** Solicits change thirteen years' experience Street Railway Accounting. Age 35; married. References. PW-125, Elec. Ry. Journal.

**EXECUTIVE** of medium sized city and interurban property. Age 35, married, and now employed. Desires position as Manager or Asst. Manager. Thoroughly familiar with operation and construction of both city and interurban lines. Especially good in handling Public relations and commission hearings. Correspondence confidential. P-124, Elec. Ry. Journal, Philadelphia.

**ELECTRICAL** engineer, college graduate, 13 years' experience. Railway specialist with experience in construction, operation, valuation and handling of men. Reports and analysis made for engineering corporations, public authorities and operating systems. Examination made of properties and service rendered, traffic surveys, schedules and equipment, etc., with special attention to improvement to and economy of operation. PW-98, Elec. Ry. Journal Philadelphia.

**ENGINEER**, 31, six years M. of W. and electrical experience, at present employed, desires change. Thorough knowledge of construction and maintenance practise on large or small properties. Best references. PW-112, Elec. Ry. Journal.

**GENERAL** manager; American; 47 years of age; wide experience in high-class electric light; large power and electric railway designing; construction and operation desires position managing property or group of properties having gross earnings more than \$1,000,000 gross. Address Manager, Suite 716 61 Broadway, New York.

**GENERAL** superintendent of property operating 80 city and interurban cars desires to change. Experience covers transportation, shop and track departments. References from present and past employers. P-123, Elec. Ry. Journal, Philadelphia.

**GENERAL** manager now employed and in present position for ten years desires to get in touch with a small or medium-sized road desiring the services of an efficient, dependable manager with a thorough knowledge of the electrical and mechanical departments, the handling of freight and express, as well as matters before the various commissions. PW-113, Elec. Ry. Journal, Philadelphia.

**HIGH-GRADE** operating man open for engagement as superintendent. Has high speed interurban, city and steam railroad experience of twenty years. First-class references; married; no preference as to locality. PW-99, Elec. Ry. Journal, Chicago.

**MASTER** mechanic; By a high grade technical and practical electric railway man with a successful record. Best references furnished. PW-90, Elec. Ry. Journal, Philadelphia.

### POSITIONS WANTED

**MASTER** mechanic or general foreman wants position; thoroughly experienced in most efficient and systematic methods of inspection and overhauling of city and interurban cars, trucks, motors, controls, complete equipment, 12 years incharge of shops; age 35; married; now employed; references. PW-102, Elec. Ry. Journal, Chicago.

**POSITION** as master mechanic wanted by man with experience both city and interurban. Can furnish best of reference. PW-87, Elec. Ry. Journal, Cleveland.

**POSITION** wanted. Manager, superintendent or auditor. Have 10 years' experience management railway and lighting property. For quick action address PW-107, Elec. Ry. Journal, Chicago.

**SUPERINTENDENT** or general line foreman can handle men and show results; familiar with catenary and direct suspension telephone and signals, transmission conduit, etc.; 25 years' experience; best of references, etc. PW-100, Elec. Ry. Journal, Cleveland.

**SUPERINTENDENT** of distribution in large railway property desires opportunity to show ability to handle successfully, larger propositions of railway light and power distribution; 20 years' experience in high and low tension construction and maintenance. PW-103, Elec. Ry. Journal.

**TRAFFIC** man; eight years' experience with large electric railways. Familiar with both freight and passenger business. PW-109, Elec. Ry. Journal, Chicago.

**TRAVELING** auditor; experienced, best of references, employed. Exempt from military service. PW-110, Elec. Ry. Journal, Chicago.

**WANTED**, position as master mechanic or superintendent of equipment. Familiar with K-type M. and H. L. controls, city and high-speed interurbans, electric locomotive and MCB work. Have had twenty-five years' experience. Can leave at once. references. PW-114, Elec. Ry. Journal, Chicago.

**WANTED**—position as Superintendent or assistant with Street Railway Company. Am at present, and have been for past ten years Superintendent for Railway Company in small sized city. Was promoted to present position from ranks of motorman. PW-116, Elec. Ry. Journal, Chicago.

**ASSISTANT** chief designing engineer of one of largest chemical plants in Canada, familiar with all types of mechanical and electrical apparatus, desires change, only responsible position with full charge considered. PW-127, Elec. Ry. Journal.

### AGENTS AND SALESMEN

#### Engineer For Sales Work

Equipment engineer for sales work. Requiring ability to make engineering analyses and tests. Must be electrical engineer. Conversant with street and interurban railway operating conditions. Position requires traveling. P-120, Elec. Ry. Journal, Chicago.

#### Salesman Wanted

Salesman with technical training in Electrical line is wanted by a large Electrical manufacturer to specialize on industrial plants and ship yards in the East. Must

### AGENTS AND SALESMEN

have record of successful sales work. Give age and past experience, as well as present salary. AS-121, Elec. Ry. Journal, Philadelphia.

#### Manufacturer Wants Salesman

Salesman with technical education wanted by a large Electrical manufacturer in the East to handle flood lighting and kindred propositions among industrial plants and ship yards. Give age and full information as to fitness. State present salary. Confidential. AS-122, Elec. Ry. Journal, Philadelphia.

### PROPOSALS

#### In the District Court of the United States for the Eastern Division of the Eastern District of Missouri

Orah D. Ridgely, et al.,  
Plaintiffs  
Ozark Valley Railroad  
Company et al.,  
Defendants  
In Equity,  
No. 126

### NOTICE OF SALE

Pursuant to order of the District Court of the United States for the Eastern District of Missouri, in the above entitled action, notice is hereby given that on **April 22nd, 1918**, at twelve o'clock noon, I will sell all the property to the Ozark Valley Railway Company, including its railroad, its right-of-way, rolling stock, machine shops, rights, assets, franchises and physical appurtenances of every description, but not including moneys, bills, accounts and claims receivable from operation, at the Court House of Wayne County, Missouri, in the City of Greenville. If at the said sale the sum of One Hundred and Fifty Thousand Dollars (\$150,000.00) in cash be offered for said property as a going concern, no other or further bids will be received, and said railroad will be sold to such purchaser, subject to the condition, however, that there shall rest upon such purchaser or purchasers, their successors and assigns, the duty to continuously maintain and operate the railroad of the defendant as a common carrier, and as such carrier efficiently perform and render to the public the services and duties of common carriers by railroad, in conformity to law; and without any right or privilege upon the part of such purchaser or purchasers, or their successors or assigns, to dismantle said road or any part thereof, or to sell for junk or salvage or remove from the track any part of the rails of said railroad, except as replacements may be necessitated and made from time to time by the usual wear and tear of operation.

In the event that at said sale there shall be no bidder of the character designated above, then the undersigned will sell the physical assets of said railroad company to the highest bidder for cash, with the right in the purchaser to discontinue the operation of, and dismantle said railroad company and remove and dispose of its rails and other equipment and all its physical property real and personal, in such manner as such purchaser may see fit; and for the purpose of such purchase the undersigned will accept in payment, at their face value plus interest, any notes representing the mortgage debt upon said railroad company, provided that in no event shall less than Twenty-five Thousand Dollars (\$25,000.00) of the purchase price be paid in cash.

B. W. Frauenthal  
Special Master, Union Sta.  
St. Louis, Mo.

There are approximately the following rails on road:

20 Miles of 60 lb. Steel.  
15 " " 56 lb. "  
10 " " 45 lb. "

# WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry  
with Names of Manufacturers and Distributors

## Acetylene Service and Apparatus.

Oxweld Acetylene Co.

## Advertising, Street Car.

Collier, Inc., Barron G.

## Air Cleaners.

Horne Mfg. Co.

## Air Rectifiers.

Holden & White, Inc.

## Alloys, Steel and Iron. (See also Bearings and Bearing Metals.)

Titanium Alloy Mfg. Co.

## Anchors, Gny.

Electric Service Supplies Co.  
Holden & White, Inc.  
Johns-Manville Co., H. W.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

## Anti-Climbers.

Railway Improvement Co.

## Armature Shafts.

Laclede Steel Co.

## Automobiles and Buses.

Brill Co., The J. G.

## Axle Straighteners.

Columbia M. W. & M. I. Co.

## Axles, Car Wheel.

Bemis Car Truck Co.  
Brill Co., The J. G.  
Carnegie Steel Co.  
Laclede Steel Co.  
National Railway Appliance Co.  
St. Louis Car Co.  
Standard Steel Works Co.  
Westinghouse Elec. & M. Co.

## Babbitt Devices.

Columbia M. W. & M. I. Co.

## Badges and Buttons.

Electric Service Supplies Co.  
International Register Co., The

## Batteries, Dry.

Johns-Manville Co., H. W.

## Batteries, Storage.

Electric Storage Battery Co.

## Bearings and Bearing Metals.

Ajax Metal Co.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
General Electric Co.  
More-Jones Brass & Metal Co.  
St. Louis Car Co.  
Westinghouse Elec. & M. Co.

## Bearings, Center and Roller Slide.

Holden & White, Inc.

## Bearings, Roller and Ball.

Gurney Ball-Bearing Co.

## Bells and Gongs.

Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
St. Louis Car Co.

## Benders, Rail.

Niles-Bement-Pond Co.  
Wharton Jr. & Co., Wm.  
Zelnicker Sup. Co., W. A.

## Boilers.

Babcock & Wilcox Co.

## Boiler Cleaning Compounds.

Dearborn Chemical Co.  
Johns-Manville Co., H. W.

## Boiler Coverings.

Johns-Manville Co., H. W.

## Boiler Tubes.

National Tube Co.

## Bond Testers.

American Steel & Wire Co.

## Bonding Apparatus.

American Steel & Wire Co.  
Electric Railway Improvement Co.  
Electric Service Supplies Co.  
Imperial Brass Mfg. Co.  
Ohio Brass Co.  
Oxweld Acetylene Co.

## Bonds, Rail.

American Steel & Wire Co.  
Electric Railway Improvement Co.  
Electric Service Supplies Co.  
General Electric Co.  
Johns-Manville Co., H. W.  
Lincoln Bonding Co.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

## Book Publishers.

McGraw-Hill Book Co., Inc.

## Boring Tools, Car Wheel.

Niles-Bement-Pond Co.

## Braces, Rail.

Kilby Frog & Switch Co.

## Brackets and Cross Arms. (See also Poles, Ties, Posts, Etc.)

Bates Expanded Steel Truss Co.  
Electric Service Supplies Co.  
Hubbard & Co.  
Lindsley Bros. Co.  
Ohio Brass Co.

## Brake Adjusters.

Holden & White, Inc.  
Westinghouse Traction Brake Co.

## Brake Shoes.

Amer. Brake Shoe & Fdry. Co.  
Barbour-Stockwell Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
St. Louis Car Co.

## Brakes, Brake Systems and Brake Parts.

Bemis Car Truck Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Holden & White, Inc.  
Horne Mfg. Co.  
National Brake Co.  
St. Louis Car Co.  
Westinghouse Trac. B. Co.

## Brooms, Track, Steel or Rattan.

Paxson Co., J. W.  
Zelnicker Supply Co., W. A.

## Brush Holders.

Anderson Mfg. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Eureka Co.

## Brushes, Carbon.

General Electric Co.  
Jeandron, W. J.  
Morgan Crucible Co.  
United States Graphite Co.  
Westinghouse Elec. & M. Co.

## Brushes, Graphite.

Dixon Crucible Co., Jos.  
United States Graphite Co.

## Bushings, Case Hardened and Manganese.

Bemis Car Truck Co.

## Cables. (See Wires and Cables.)

## Carbon Brushes. (See Brushes, Carbon.)

## Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—See these headings.)

## Car Trimmings. (For Curtains, Registers, Doors, Seats, etc.—See these headings.)

## Cars, Passenger, Freight, Express, etc.

American Car Co.  
Brill Co., The J. G.  
Kuhlman Car Co., G. C.  
McGuire-Cummings Mfg. Co.  
St. Louis Car Co.  
Wason Mfg. Co.

## Cars, Second Hand.

Electric Equipment Co.

## Cars, Self-Propelled.

Electric Storage Battery Co.  
General Electric Co.

## Castings, Brass, Composition or Copper.

Anderson Mfg. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
Horne Mfg. Co.  
More-Jones Brass & Metal Co.

## Castings, Gray Iron and Steel.

American Steel Foundries.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Horne Mfg. Co.  
St. Louis Car Co.  
Standard Steel Works Co.  
Union Spring & Mfg. Co.

## Castings, Malleable and Brass.

Amer. Brake Shoe & Fdry. Co.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Horne Mfg. Co.  
St. Louis Car Co.

## Catchers and Retrievers, Trolley.

Electric Service Supplies Co.  
Holden & White, Inc.  
Horne Mfg. Co.  
Ohio Brass Co.  
Wood Co., Chas. N.

## Ceiling, Car.—(See Head Lining.)

## Circuit Breakers.

Automatic Reclosing Circuit Breaker Co.  
General Electric Co.  
Westinghouse Elec. & Mfg. Co.

## Clamps and Connectors for Wires and Cables.

Anderson Mfg. Co., A. & J. M.  
Electric Service Supplies Co.  
General Electric Co.  
Hubbard & Co.  
Ohio Brass Co.  
Westinghouse Elec. & Mfg. Co.

## Cleaners and Scrapers Track.—(See also Snow-Plows, Sweepers and Brooms.)

Brill Co., The J. G.  
Ohio Brass Co.  
Van Dorn & Dutton Co.

## Clusters and Sockets.

General Electric Co.

## Coal and Ash Handling.—(See Conveying and Hoisting Machinery.)

## Coasting Recorders.

Railway Improvement Co.

## Coll Bandlog and Winding Machines.

Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.

## Colls, Armature and Field.

Cleveland Armature Works.  
Columbia M. W. & M. I. Co.  
D & W Fuse Co.  
General Electric Co.  
Independent Lamp & Wire Co.  
Westinghouse Elec. & M. Co.

## Colls, Choke and Kicking.

Electric Service Supplies Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.

## Coin-Counting Machines.

International Register Co., The  
Johnson Fare Box Co.

## Commutator Slitters.

Electric Service Supplies Co.  
General Electric Co.  
Westinghouse Elec. & Mfg. Co.  
Wood Co., Chas. N.

## Commutator Truing Devices.

General Electric Co.

## Commutators or Parts.

Cleveland Armature Works.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
General Electric Co.  
Westinghouse Elec. & Mfg. Co.

## Compressors, Air.

General Electric Co.  
Westinghouse Trac. B. Co.

## Concrete Mixers

Jaeger Machine Co.

## Condensers

General Electric Co.  
Westinghouse Elec. & M. Co.

## Conduits, Underground.

Johns-Manville Co., H. W.

## Controller Regulators.

Electric Service Supplies Co.

## Controllers or Parts.

Columbia M. W. & M. I. Co.  
General Electric Co.  
Horne Mfg. Co.  
Johns-Manville Co., H. W.  
Westinghouse Elec. & Mfg. Co.

## Controlling Systems.

General Electric Co.  
Westinghouse Elec. & Mfg. Co.

## Converters, Rotary.

General Electric Co.  
Westinghouse Elec. & Mfg. Co.

## Conveying and Hoisting Machinery.

Columbia M. W. & M. I. Co.  
Green Engrg. Co.

## Cord, Bell, Trolley, Register, etc.

Brill Co., The J. G.  
Electric Service Supplies Co.  
International Register Co., The  
Roebbling's Sons Co., John A.  
Samson Cordage Works

## Cord Connectors and Couplers.

Electric Service Supplies Co.  
Samson Cordage Works  
Wood Co., Chas. N.

## Couplers, Car.

Brill Co., The J. G.  
Ohio Brass Co.  
Van Dorn Coupler Co.  
Westinghouse Trac. B. Co.

## Couplings, Conduit.

Horne Mfg. Co.

## Cranes. (See also Hoists.)

Niles-Bement-Pond Co.  
Van Dorn & Dutton Co.

## Croosofting. (See Wood Preservatives.)

## Cross Arms. (See Brackets.)

## Crossing Foundations.

Balkwill Manganese Crossing Co.  
International Steel Tie Co.

## Crossing Signals. (See Signals, Crossing.)

## Crossings, Track. (See Track, Special Work.)

## Culverts.

American Rolling Mill Co.  
Bark River B. & Culvert Co.  
California Cor. Culvert Co.  
Canada Ingot Iron Co., Ltd.  
Canton Culvert & Silo Co.  
Coast Culvert & Flume Co.  
Corrugated Culvert Co.  
Delaware Metal Culvert Co.  
Dixie Culvert & Metal Co.  
Hardisty Mfg. Co., R.  
Illinois Corrugated Metal Co.  
Independence Cor. Cul. Co.  
Iowa Pure Iron Culvert Co.  
Kentucky Culvert Mfg. Co.  
Lone Star Culvert Co.  
Lyle Corrugated Culvert Co.  
Michigan Bridge & Pipe Co.  
Montana Culvert Co.  
Nebraska Culvert & Mfg. Co.  
Nevada Metal Mfg. Co.





Model 370—A.C. and D.C. Ammeter

One of the Portable Electrodynamometer Group, which also includes Model 310 Single Phase and D.C. Wattmeter, Model 329 Polyphase Wattmeter and Model 341 A.C. and D.C. Voltmeter.

The characteristics of the group are extreme accuracy (guaranteed within a fraction of 1% full scale value), adaptability for use on circuits of any commercial frequency and any wave form, great overload capacity, low moment of inertia, effective damping and shielding, and the legibility and remarkable uniformity of the hand calibrated scales.

## Quality That Speaks

Far more than we can say about Weston pre-eminence is revealed fully, unmistakably, emphatically, in every detail of

# Weston

## Indicating Instruments

Their superiority is so marked, so easily demonstrated by test that only one decision will be possible after you have made comparisons.

Weston Indicating Instruments include a great variety of groups for portable or switchboard service on A. C. or D. C. Circuits, Instruments designed expressly for testing and laboratory use, for motor car and boat electrical systems, and many others for special purposes. Write for Bulletins or Catalogs describing those which interest you.

### Weston Electrical Instrument Company

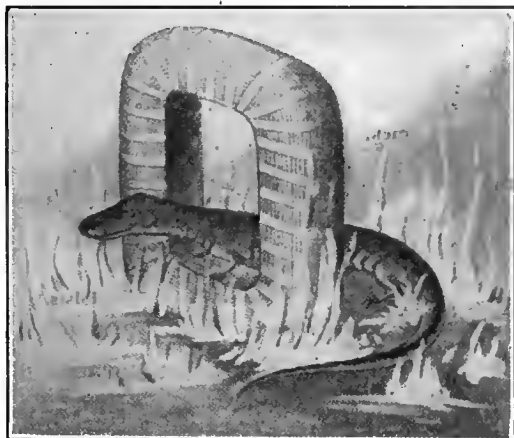
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## WHAT AND WHERE TO BUY

New England Metal Cul. Co.  
North East Metal Co.  
Northwestern Sheet & I. Wks.  
O'Neill Co., W. Q.  
Ohio Corrugated Culvert Co.  
Pennsylvania Metal Cul. Co.  
Road Supply & Metal Co.  
Sioux Falls Metal Cul. Co.  
Spokane Cul. & Tank Co.  
Tennessee Metal Culvert Co.  
United States Bridge & Pipe Co.  
Utah Corr. Cul. & Flume Co.  
Virginia Metal & Culvert Co.  
Western Metal Mfg. Co.  
Wyatt Metal & Boiler Works.

**Curtains and Curtain Fixtures.**  
Brill Co., The J. G.  
Electric Service Supplies Co.  
Hartshorn Company, Stewart  
St. Louis Car Co.

**Cutting Apparatus, Oxy-Acetylene.**  
Imperial Brass Mfg. Co.  
Oxweld Acetylene Co.

**Derailing Devices. (See also Track Work.)**  
Cleveland Frog & Crossing Co.  
Wharton Jr. & Co., Wm.

**Destination Signa.**  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.

**Detective Service.**  
Wisch Service, P. Edward

**Door Operating Devices.**  
Consolidated Car Heating Co.  
National Pneumatic Co.

**Doors, Asbestos.**  
Johns-Manville Co., H. W.

**Doors and Door Fixtures.**  
Brill Co., The J. G.  
General Electric Co.  
Hale & Kilburn Co.

**Doors, Folding Vestibule.**  
National Pneumatic Co.

**Draft Rigging. (See Couplers.)**

**Drills, Track.**  
American Steel & Wire Co.  
Electric Service Supplies Co.  
Niles-Bement-Pond Co.  
Ohio Brass Co.

**Dryers, Sand.**  
Electric Service Supplies Co.  
Zelnicker Sup. Co., W. A.

**Engineers, Consulting, Contracting and Operating.**  
Archbold-Brady Co.  
Arnold Co., The.  
Beeler, John A.  
Byllesby & Co., Inc., H. M.  
Ford, Bacon & Davis.  
Jackson, D. C. & Wm. B.  
Richey, Albert S.  
Sanderson & Porter.  
Seefeld Engineering Co.  
Sloan, Huddle, Feustel & Freeman  
Stone & Webster.  
White Companies, The J. G.  
Woodmansee & Davidson Engineering Co.

**Engines, Gas and Oil.**  
Westinghouse Elec. & Mfg. Co.

**Engines, Steam.**  
Westinghouse Elec. & Mfg. Co.

**Fare Boxes.**  
Brill Co., The J. G.  
Cleveland Fare Box Co.  
Johnson Fare Box Co.  
International Register Co., The.  
National Railway Appliance Co.

**Fences, Woven Wire and Fence Posts.**  
American Steel & Wire Co.  
Page Steel & Wire Co.  
Standard Steel Mould Co.

**Fenders and Wheel Guards.**  
Brill Co., The J. G.  
Cleveland Fare Box Co.  
Consolidated Car Fender Co.  
Electric Service Supplies Co.  
Star Brass Works.

**Fibre and Fibre Tubing.**  
Johns-Manville Co., H. W.  
Westinghouse Elec. & Mfg. Co.

**Field Coils (See Coils.)**

**Filters, Water.**  
Seafie & Sona Co., Wm. B.

**Fire Extinguishing Apparatus.**  
Johns-Manville Co., H. W.

**Fire-Proofing Material.**  
Johns-Manville Co., H. W.

**Floodlights.**  
Electric Service Supplies Co.

**Flooring Composition.**  
American Mason Safety Tread Co.  
Johns-Manville Co., H. W.

**Forgings.**  
Eureka Co.  
Laclede Steel Co.  
Standard Steel Works Co.

**Frogs, Track. (See Track Work.)**

**Furnaces. (See Stokers.)**

**Fuses and Fuse Boxes.**  
Columbia M. W. & M. I. Co.  
D. & W Fuse Co.  
General Electric Co.  
Johns-Manville Co., H. W.  
Westinghouse Elec. & Mfg. Co.

**Fuses, Refillable.**  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Horne Mfg. Co.

**Gaskets.**  
Johns-Manville Co., H. W.  
Power Specialty Co.  
Westinghouse Traction Brake Co.

**Gas Producers.**  
Westinghouse Elec. & Mfg. Co.

**Gates, Car.**  
Brill Co., The J. G.

**Gages, Oil and Water.**  
Ohio Brass Co.

**Gear Blanks.**  
Carnegie Steel Co.  
Standard Steel Works Co.

**Gear Cases.**  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
Westinghouse Elec. & Mfg. Co.

**Gears and Pinions.**  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
National Railway Appliance Co.  
Nuttall Co., R. D.  
Van Dorn & Dutton Co.

**Generating Sets, Gas-Electric.**  
General Electric Co.

**Generators.**  
General Electric Co.  
Westinghouse Elec. & Mfg. Co.

**Gongs. (See Bells and Gongs.)**

**Graphite.**  
Dixon Crucible Co., Joseph.  
Morgan Crucible Co.

**Greases. (See Lubricants.)**

**Grinders and Grinding Supplies.**  
Indianapolis Switch & Frog Co.  
Metal & Thermit Corp.  
Railway Track-work Co.

**Guards, Trolley.**  
Electric Service Supplies Co.  
Ohio Brass Co.

**Harps, Trolley.**  
Anderson M. Co., A. & J. M.  
Electric Service Supplies Co.  
Hensley Trolley & Mfg. Co.  
More-Jones B. & M. Co.  
Nuttall Co., R. D.  
Star Brass Works.

**Headlights.**  
Electric Service Supplies Co.  
General Electric Co.  
Ohio Brass Co.  
St. Louis Car Co.

**Henters, Car (Electric.)**  
Consolidated Car Heating Co.  
Gold Car Heating & Lighting Co.  
Smith Heater Co., Peter.

**Heaters, Car, Hot Air and Water.**  
Cooper Heater Co.  
Smith Heater Co., Peter.

**Henters, Car (Stove.)**  
Electric Service Supplies Co.  
Smith Heater Co., Peter.

**Hoists and Lifts.**  
Columbia M. W. & M. I. Co.  
Duff Mfg. Co.  
Ford Chain Block & Mfg. Co.  
Niles-Bement-Pond Co.  
Van Dorn & Dutton Co.

**Hose, Bridges.**  
Ohio Brass Co.

**Hose, Pneumatic and Fire.**  
Johns-Manville Co., H. W.  
Westinghouse Traction Brake Co.

**Hydraulic Machinery.**  
Niles-Bement-Pond Co.

**Hydrogrounds.**  
Horne Mfg. Co.

**Inspection.**  
Electrical Testing Lab's.

**Instruments, Measuring, Testing and Recording.**  
Economy Electric Devices Co.  
General Electric Co.  
Johns-Manville Co., H. W.  
Westinghouse Elec. & M. Co.  
Weston Elec'l Instrument Co.

**Insulating Cloth, Paper and Tape.**  
General Electric Co.  
Horne Mfg. Co.  
Johns-Manville Co., H. W.  
Mitchell-Rand Mfg. Co.  
Standard Woven Fabric Co.  
Westinghouse Elec. & M. Co.

**Insulation. (See also Paints.)**  
Anderson M. Co., A. & J. M.  
Drew Electric & Mfg. Co.  
Electric Service Supplies Co.  
General Electric Co.  
Holden & White, Inc.  
Horne Mfg. Co.  
Johns-Manville Co., H. W.  
Mitchell-Rand Mfg. Co.  
Westinghouse Elec. & M. Co.

**Insulators. (See also Line Material.)**  
Anderson M. Co., A. & J. M.  
Electric Service Supplies Co.  
General Electric Co.  
Horne Mfg. Co.  
Johns-Manville Co., H. W.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

**Insulator Pins.**  
Electric Service Supplies Co.  
Hubbard & Co.

**Insurance, Fire.**  
Marsh & McLennan.

**Jacks. (See also Cranes, Hoists and Lifts.)**

Brill Co., The J. G.  
Buckeye Jack Mfg. Co.  
Columbia M. W. & M. I. Co.  
Duff Manufacturing Co.  
National Ry. Appliance Co.  
Templeton, Kenly Co., Ltd.

**Joints, Rail.**  
Carnegie Steel Co.  
Rail Joint Co.  
Zelnicker Sup. Co., W. A.

**Journal Boxes.**  
Bemis Car Truck Co.  
Brill Co., The J. G.

**Junction Boxes.**  
Johns-Manville Co., H. W.

**Laboratory.**  
Electrical Testing Lab's.

**Lamp Guards and Fixtures.**  
Anderson M. Co., A. & J. M.  
Electric Service Supplies Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.

**Lamps, Arc and Incandescent. (See also Headlights.)**  
Anderson M. Co., A. & J. M.  
General Electric Co.  
Westinghouse Elec. & M. Co.

**Lamps, Signal and Marker.**  
Ohio Brass Co.

**Lathes, Car Wheel.**  
Niles-Bement-Pond Co.

**Lighting Regulators, Car.**

Holden & White, Inc.

**Lightning Arrestors.**  
Horne Mfg. Co.

**Lightning Protection.**  
Anderson M. Co., A. & J. M.  
Electric Service Supplies Co.  
General Electric Co.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

**Line Material. (See also Brackets, Insulators, Wires, etc.)**  
Anderson M. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Drew Electric & Mfg. Co.  
Electric Service Supplies Co.  
Eureka Co.  
General Electric Co.  
Holden & White, Inc.  
Hubbard & Co.  
Johns-Manville Co., H. W.  
More-Jones B. & M. Co.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

**Locomotives, Electric.**  
Brill Co., The J. G.  
General Electric Co.  
Westinghouse Elec. & M. Co.

**Lubricating Engineers.**  
Galena-Signal Oil Co.

**Lubricants, Oil and Grease.**  
Dearborn Chemical Co.  
Dixon Crucible Co., Jos.  
Galena-Signal Oil Co.

**Lumber. (See Poles, Ties, etc.)**

**Machine Tools.**  
Columbia M. W. & M. I. Co.  
Niles-Bement-Pond Co.

**Machine Work.**  
Columbia M. W. & M. I. Co.  
Holden & White, Inc.  
Horne Mfg. Co.

**Meters, Car, Watt-Hour.**  
Economy Electric Devices Co.

**Meters. (See Instruments.)**

**The Jaeger Machine Company**  
Dublin Avenue, Columbus, Ohio

Electric Service Supplies Co.  
Wood Co., Chas. N.

Mirrors for Motormen.  
Drew Electric & Mfg. Co.

Motors, Electric.  
Westinghouse Elec. & M. Co.

Motor Generation, Bonding and  
Welding.  
Lincoln Bonding Co.

Nuts and Bolts.  
Barbour-Stockwell Co.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Hubbard & Co.

Oils. (See Lubricants.)

Oxy-Acetylene. (See Cutting Ap-  
paratus, Oxy-Acetylene.)

Packing.  
Johns-Manville Co., H. W.  
Power Specialty Co.  
Westinghouse Traction Brake Co.

Packing Rings.  
Johns-Manville Co., H. W.

Paints and Varnishes. (Insu-  
lating.)  
Johns-Manville Co., H. W.  
Mitchell-Rand Mfg. Co.

Paints and Varnishes. (Preserva-  
tive.)  
Dixon Crucible Co., Jos.  
Johns-Manville Co., H. W.

Paints and Varnishes for Wood-  
work.  
National Ry. Appliance Co.

Paving Brick, Filler and Stretcher.  
Nelsonville Brick Co.

Paving Material.  
Am. Brake Shoe & Fdy. Co.  
Nelsonville Brick Co.

Pickups, Trolley Wire.  
Electric Service Supplies Co.  
Ohio Brass Co.

Pinion Pullers.  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
General Electric Co.  
Wood Co., Chas. N.

Pinions. (See Gears.)

Pins, Case Hardened, Wood and  
Iron.  
Bemis Car Truck Co.  
Electric Service Supplies Co.  
Ohio Brass Co.  
Westinghouse Traction Brake Co.

Pipe.  
National Tube Co.

Pipe Fittings.  
Power Specialty Co.  
Standard Steel Works Co.  
Westinghouse Traction Brake Co.

Planers. (See Machine Tools.)

Pilers, Insulated  
Electric Service Supplies Co.  
National Railway Appliance Co.

Pole Reinforcing.  
Hubbard & Co.

Pole Sleeves.  
Drew Electric & Mfg. Co.

Poles and Ties, Treated.  
Lindsley Bros. Co.  
Page & Hill Co.  
Valentine-Clark Co.

Poles, Metal Street.  
Bates Expanded Steel Truss Co.  
Hubbard & Co.

Pole Sleeves.  
Drew Elec. & Mfg. Co.

Poles, Ties, Posts, Piling and  
Lumber.  
Carney & Co., B. J.  
Page & Hill Co.  
Valentine-Clark Co.  
White Marble Lime Co.

Poles, Trolley.  
Anderson M. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.

## WHAT AND WHERE TO BUY

National Tube Co.  
Nuttall Co., R. D.

Poles, Tubular Steel.  
National Tube Co.

Power Saving Devices.  
Arthur Power-Saving Recorder Co.  
Railway Improvement Co.

Pressure Regulators.  
General Electric Co.  
Ohio Brass Co.  
Westinghouse Electric & Mfg. Co.

Punches, Ticket.  
Bonney-Vehslage Tool Co.  
Horne Mfg. Co.  
International Register Co., The  
Wood Co., Chas. N.

Purifiers, Feed Water  
Scaife & Sons Co., Wm. B.

Rail Grinders. (See Grinders.)

Rail Welding. (See Brazing and  
Welding Processes.)

Rails, Relaying.  
Zelnicker Supply Co., W. A.

Rattan.  
Brill Co., The J. G.  
Electric Service Supplies Co.  
Hale & Kilburn Co.  
St. Louis Car Co.

Recorders, Power Saving.  
Arthur Power-Saving Recorder Co.

Registers and Fittings.  
Bonham Recorder Co.  
Brill Co., The J. G.  
Electric Service Supplies Co.  
International Register Co., The  
Rooke Automatic Register Co.

Reinforcement, Concrete.  
American Steel & Wire Co.

Repair Shop Appliances. (See also  
Coil Banding and Winding  
Machines.)

Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.

Repair Work. (See also Colls.)  
Cleveland Armature Works.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Independent Lamp & Wire Co.  
Westinghouse Elec. & M. Co.

Replacers, Car.  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.

Resistance, Grid.  
Columbia M. W. & M. I. Co.

Resistance, Wire and Tube.  
General Electric Co.  
Westinghouse Elec. & M. Co.

Retrievers, Trolley. (See Catchers  
and Retrievers, Trolley.)

Rheostats.  
General Electric Co.  
Westinghouse Elec. & M. Co.

Roofing, Building.  
Johns-Manville Co., H. W.

Roofing, Car.  
Johns-Manville Co., H. W.

Sanders, Track.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
Cleveland Fare Box Co.  
Electric Service Supplies Co.  
Horne Mfg. Co.  
Holden & White, Inc.  
Ohio Brass Co.  
St. Louis Car Co.

Sash Fixtures, Car.  
Brill Co., The J. G.

Sash Metal, Car Window.  
Hale & Kilburn Co.

Scales, Weights, Balances and  
Dynamometers.  
Horne Mfg. Co.

Scrapers, Truck. (See Cleaners and  
Scrapers, Truck.)

Sents, Car.  
Brill Co., The J. G.  
Hale & Kilburn Co.  
St. Louis Car Co.

Second-Hand Equipment.  
(See also pages 58, 59)  
Archer & Baldwin.  
MacGovern & Co., Inc.

Shade Rollers.  
Hartshorn Co., Stewart

Shades, Vestibule.  
Brill Co., The J. G.  
Electric Service Supplies Co.

Shovels.  
Hubbard & Co.

Signal Systems, Block.  
Electric Service Supplies Co.  
Federal Signal Co.  
U. S. Electric Signal Co.  
Wood Co., Chas. N.

Signals, Car Starting.  
Consolidated Car Heating Co.  
National Pneumatic Co.

Signal Systems, Highway Crossing.  
U. S. Electric Signal Co.

Slack Adjusters.  
(See Brake Adjusters.)

Sleet Wheels and Cutters.  
Anderson Mfg. Co., A. & J. M.  
Bonney-Vehslage Tool Co.  
Columbia M. W. & M. I. Co.  
Drew Electric & Mfg. Co.  
Holden & White, Inc.  
More-Jones Brass & Metal Co.  
Nuttall Co., R. D.

Snow-Plows, Sweepers and Brooms.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
Consolidated Car Fender Co.

Soldering and Brazing Apparatus.  
(See Welding, Processes and  
Apparatus.)

Speed Indicators.  
Johns-Manville Co., H. W.

Spikes.  
American Steel & Wire Co.

Splicing Compounds  
Johns-Manville Co., H. W.  
Standard Woven Fabric Co.  
Westinghouse Elec. & Mfg. Co.

Splicing Sleeves. (See Clamps and  
Connectors.)

Springs, Car & Truck.  
American Steel Foundries.  
American Steel & Wire Co.  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Standard Steel Works Co.  
Union Spring & Mfg. Co.

Sprinklers, Track & Road.  
Brill Co., The J. G.  
St. Louis Car Co.

Steps, Car.  
American Mason S. T. Co.  
Universal Safety Tread Co.

Stokers, Mechanical.  
Babcock & Wilcox Co.  
Green Eng'g. Co.  
Westinghouse Elec. & M. Co.

Storage Batteries. (See Batteries,  
Storage.)

Straps, Car, Sanitary.  
Holden & White, Inc.  
Railway Improvement Co.

Structural Iron. (See Bridges.)

Superheaters.  
Babcock & Wilcox Co.  
Power Specialty Co.

Sweepers, Snow. (See Snow  
Plows, Sweepers & Brooms.)

Switch Stands.  
Kilby Frog & Switch Co.  
Ramapo Iron Works.  
Wharton Jr. & Co., Wm.

Switches, Track. (See Track, Spe-  
cial Work.)

Switches & Switchboards.  
Anderson Mfg. Co., A. & J. M.  
Electric Service Supplies Co.  
General Electric Co.  
Indianapolis Switch & Frog Co.  
Westinghouse Elec. & M. Co.

Tampers, Tie.  
Ingersoll-Rand Co.

Tapes and Cloths. (See Insulating  
Cloths, Paper and Tape.)

Telephones and Parts.  
Electric Service Supplies Co.

Testing, Commercial & Electrical.  
Elec'l Testing Laboratories.

Testing Instruments. (See Instru-  
ments, Electrical Measuring,  
Testing, etc.)

Thermostats.  
Consolidated Car Heating Co.  
Gold Car Heating & Lighting Co.  
Railway Utility Co.  
Smith Heater Co., Peter.

Ticket Choppers & Destroyers.  
Electric Service Supplies Co.

Ties, Mechanical.  
Dayton Mechanical Tie Co.

Ties and Tie Rods, Steel.  
Barbour-Stockwell Co.  
Carnegie Steel Co.  
International Steel Tie Co.

Ties, Wood Cross. (See Poles, Ties,  
Posts, etc.)

Tools, Track & Miscellaneous.  
American Steel & Wire Co.  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
Hubbard & Co.  
Johns-Manville Co., H. W.  
Railway Track-work Co.

Torches, Acetylene. (See Cutting  
Apparatus.)

Towers & Transmission Structures.  
Archbold-Brady Co.  
Bates Exp. Steel Truss Co.  
Westinghouse Elec. & M. Co.

Track, Special Work.  
Barbour-Stockwell Co.  
Cleveland Frog & Cross, Co.  
Columbia M. W. & M. I. Co.  
Indianapolis Switch & Frog Co.  
Kilby Frog & Switch Co.  
New York Switch & Crossing Co.  
Ramapo Iron Works.  
Wharton Jr. & Co., Wm.

Transfers. (See Tickets.)

Transfer Tables.  
Archbold-Brady Co.

Transformers.  
General Electric Co.  
Westinghouse Elec. & M. Co.

Treads, Safety, Stairs, Car Steps.  
American Mason S. T. Co.  
Universal Safety Tread Co.

Trolley Bases.  
Anderson Mfg. Co., A. & J. M.  
Electric Service Supplies Co.  
General Electric Co.  
Holden & White, Inc.  
Horne Mfg. Co.  
More-Jones Brass & Metal Co.  
National Railway Appliance Co.  
Nuttall Co., R. D.  
Ohio Brass Co.



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What was the best yesterday may be second best today, and far behind tomorrow. St. Louis-built cars are designed according to most up-to-date practice—that means they are always a few jumps ahead of the field.

*If you have a problem of any kind pertaining to cars we will gladly co-operate in its solution.*

**St. Louis Car Company**  
St. Louis, Mo.

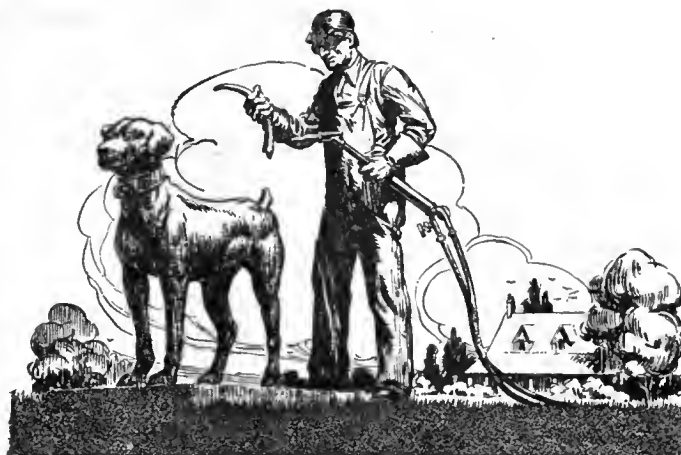


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**T**HE dog is, of course, a cast-iron specimen. To mend his broken tail with an OXWELD BLOWPIPE was a simple operation.

Variations of this unique application are common in all the big museums where the same welding equipment is used to repair all sorts of broken bronze or metal art objects. Such uses are, of course, comparatively small.

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Titanium Rail for  
Curved Track at  
Brookline, Mass.

The grinding, uneven wear at curves soon finds out the many weak spots in the ordinary rail.

First comes a period of screechy, disagreeable operation; then the premature, costly renewal.

# TITANIUM TREATMENT

## Defers Your Rail Renewals

at a cost per ton which is amazingly low in comparison with the benefits derived—such as doubling the life of the rail and cutting paving rehabilitation charges in half.

The use of Titanium-treated rails by Boston, Philadelphia, Brooklyn, Pittsburgh, St. Louis, Los Angeles, San Francisco and other cities surely warrants your attention.

## TITANIUM ALLOY MANUFACTURING COMPANY

Operating Under Rossi Patents

Processes and Products Patented

General Office and Works:  
Niagara Falls, N. Y.



Pittsburgh Office: Oliver Building  
Chicago Office: Peoples Gas Building

New York Office: 165 Broadway

AGENTS:

Pacific Coast: ECCLES & SMITH CO., Los Angeles, San Francisco, Portland  
Great Britain and Europe: T. ROWLANDS & CO., Sheffield, England



**HELP OUR TOWN  
WIN THE RIGHT  
TO FLY THIS FLAG**

**HONOR FLAG  
3<sup>rd</sup>  
LIBERTY LOAN**

**AWARDED BY THE UNITED STATES TREASURY  
DEPARTMENT TO TOWNS EXCEEDING THEIR QUOTA**

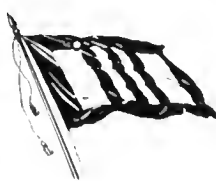
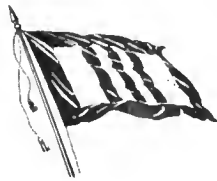
## Street Cars Telling the Message of the Liberty Loan Flag

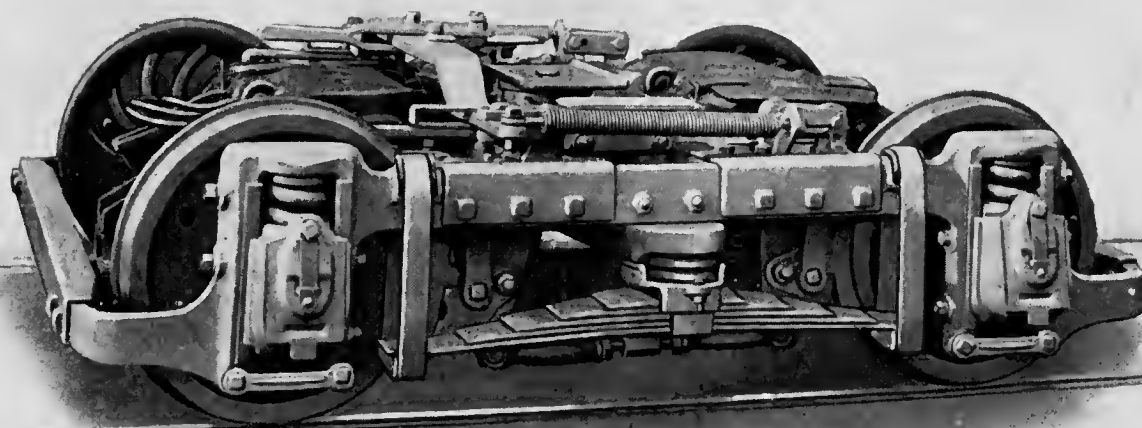
ABOVE is reproduced in one color the street car card featuring the Official Flag of the Third Liberty Loan. This Honor Flag is awarded by the United States Treasury Department to towns exceeding their quota.

The contributing car advertising companies were pleased to have their medium selected to herald this scheme to the people of the United States, several days in advance of the Loan. On the opening day of the Loan this flag card was replaced by a series of other cards making a stirring patriotic appeal.

**Barron J. Collier**  
**INCORPORATED**

Candler Bldg.  
220 W. 42nd Street, New York City



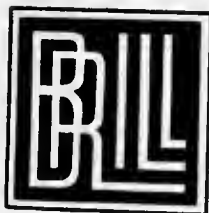


## The Brill 77-E Truck

The 77-E Truck is the right type for light interurban service or for low-level cars requiring a four-motor equipment. It has the same spring system as the Brill single- and double-motor trucks, in fact the only essential difference from the general design of the latter is in its having inside-hung motors. The Graduated Spring System and Bolster Guide make it ride smoothly during braking and starting and with both light and heavy loads. The solid forged side frames, one-piece cast steel bolster, "Half-ball" brake hangers, oil-retaining center plates and other distinctive features give the truck long life and insure low maintenance costs. Write for 77-E Truck Bulletin for full information including dimension tables.

THE J. G. BRILL COMPANY  
PHILADELPHIA, PA.

G. C. KUHLMAN CAR CO.  
CLEVELAND, OHIO



AMERICAN CAR COMPANY  
ST. LOUIS, MO.

WASON MANUFACTURING CO.  
SPRINGFIELD, MASS.

# The GE-258 Motor

## For Fast Service and Less Maintenance

The GE-258 motor has the greatest capacity for its weight of any railway motor ever manufactured. This high capacity permits, without injury to the motors, the highest practicable rate of acceleration—a most important feature on frequent-stop lines and in congested streets, resulting in faster schedule speed. This attracts traffic, for passengers like the feeling of hustle and rapid movement which they obtain in these cars.

The low weight of these cars eliminates much of the repair work on the track, while the small current taken reduces wear on the trolley wire and requires less feeder copper.



# General Electric Company



Special Mechanical and Engineering Edition

# ELECTRIC RAILWAY JOURNAL

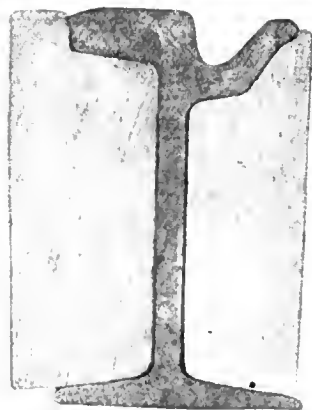
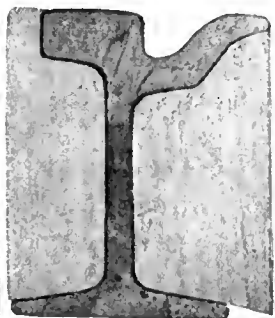
McGraw-Hill Company, Inc., April 20, 1918



## The Alcott Rail Filler and Key Block Paving System Has No Equal for Economy and Durability

The illustration above shows what the Alcott System is doing on Broadway between the Woolworth Building and the New York Post Office. The Key Block pavement was installed at a cost 50% less than regular granite block pavement. White oak rail filler prolongs the life of badly worn rails at least five years.

Edward Alcott, Manassas, Va.





# Westinghouse



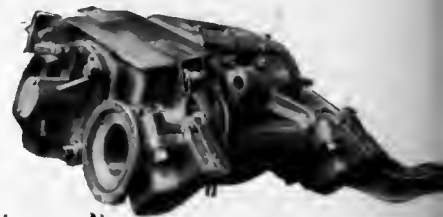
No. 333--120 Horsepower  
"The Pacemaker" for Sustained High  
Speed, Heavy Interurban Service



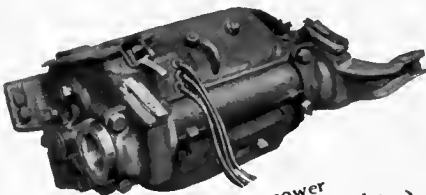
No. 548--95 Horsepower  
The Standard Interurban Motor  
of the Country



No. 306--CV.65 Horsepower  
Its Record both in Economy and Reliability  
has made it a "Universal Favorite"



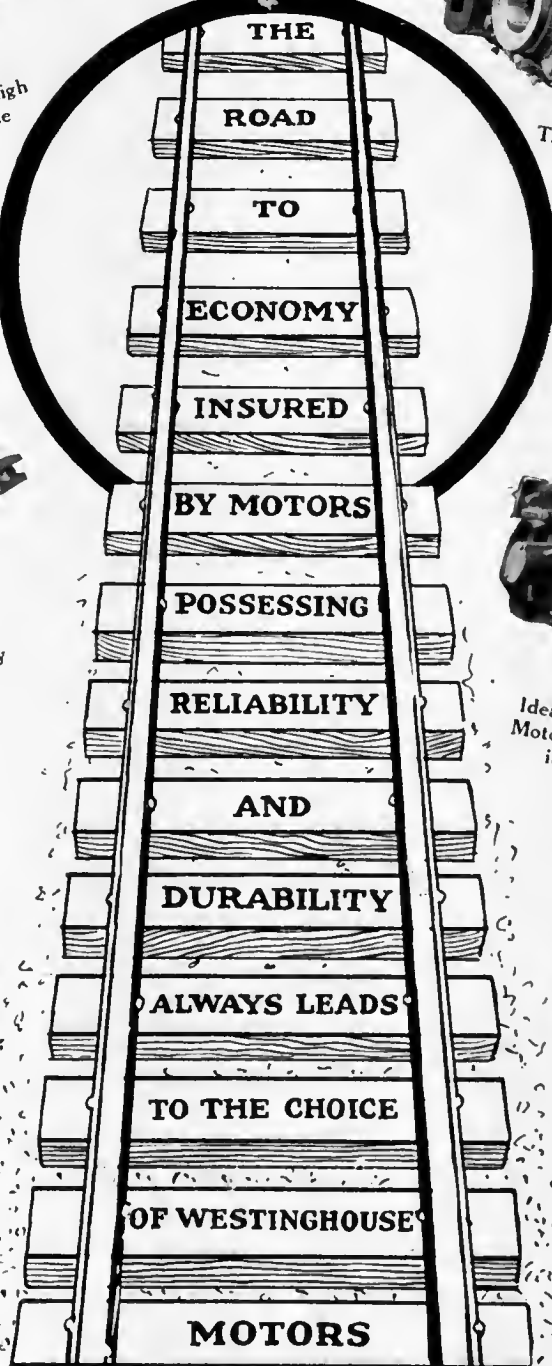
No. 532--50 Horsepower  
Ideal for Replacement of Obsolete  
Motors. Ample Clearances Permit  
its use on Both 24 and 33"  
Wheel Cars



No. 514--40 Horsepower  
The "Baby Motor" that made the  
Low Floor 24" Wheel Car possible



No. 506--25 Horsepower  
Westinghouse Electric's Most  
Recent Railway Motor Achievement  
the "Wee" 506 for Light Weight  
Quick Service Cars



## A MOTOR FOR EVERY SERVICE

Westinghouse Electric & Manufacturing Company  
East Pittsburgh, Pennsylvania

# Electric Railway Journal

H. W. BLAKE, *Editor*

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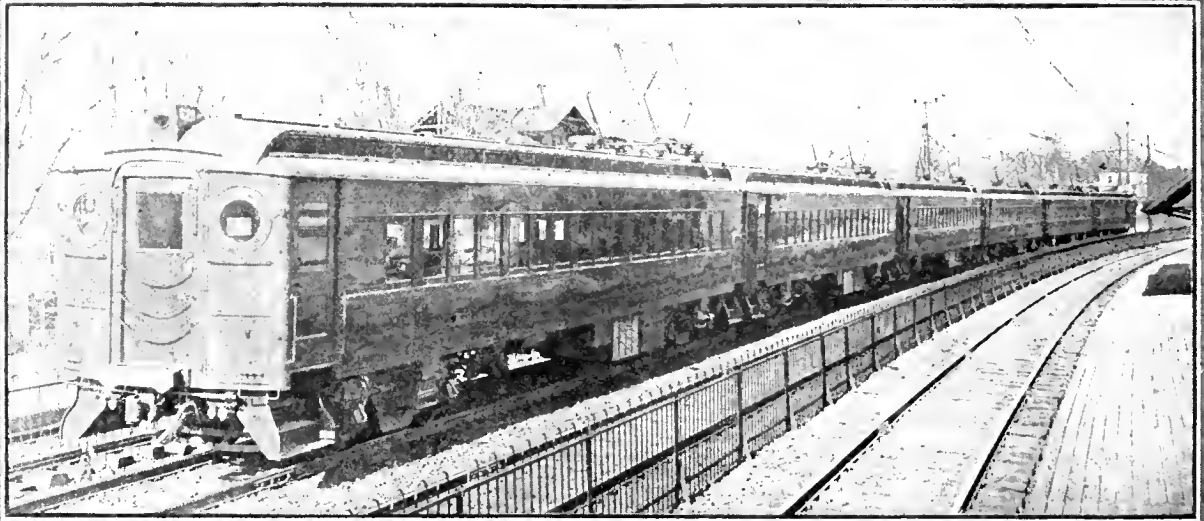
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# Power and Flexibility



Electrically operated train on the Paoli division, P. R. R., equipped with Electro-Pneumatic Brake

The Electro-Pneumatic brake possesses the power and flexibility which insures safety of High-Speed train movement and short, smooth station stops.

*Brake Building our Business for a Lifetime*

## Westinghouse Traction Brake Company

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Boston, Mass.  
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Los Angeles, Cal.

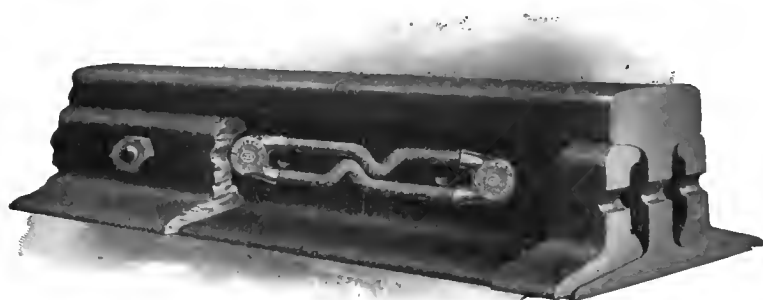


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New York, N. Y.  
Pittsburgh, Pa.

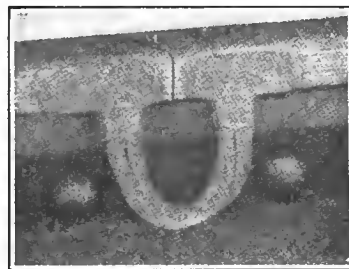
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Seattle, Wash.  
St. Louis, Mo.  
St. Paul, Minn.



# PRODUCTS



O-B Stud Terminal Bond  
(Patented)



O-B Gas-Weld Bonds  
(Patented)

## Better Bonds—Less Power Wasted

Each joint in your track is wasting power unless it is well bonded with good bonds.

Not only does poor bonding cause a heavy drain on the coal pile, but it also means a greater demand on the generating equipment. For a given output at the generator, good bonding brings a larger available amount of current where it's needed—at the car.

Substantial though it is, power saving is but one of the profitable results of good bonding. Motor trouble is diminished, schedules better maintained, headlights and car lights improved.

Are your tracks well-bonded with good bonds?

O-B Bonds are good bonds.

There is an O-B Bond for every usual or unusual condition.

Prompt shipment of any standard type.

**The Ohio Brass Company, Mansfield, Ohio**

New York

Philadelphia

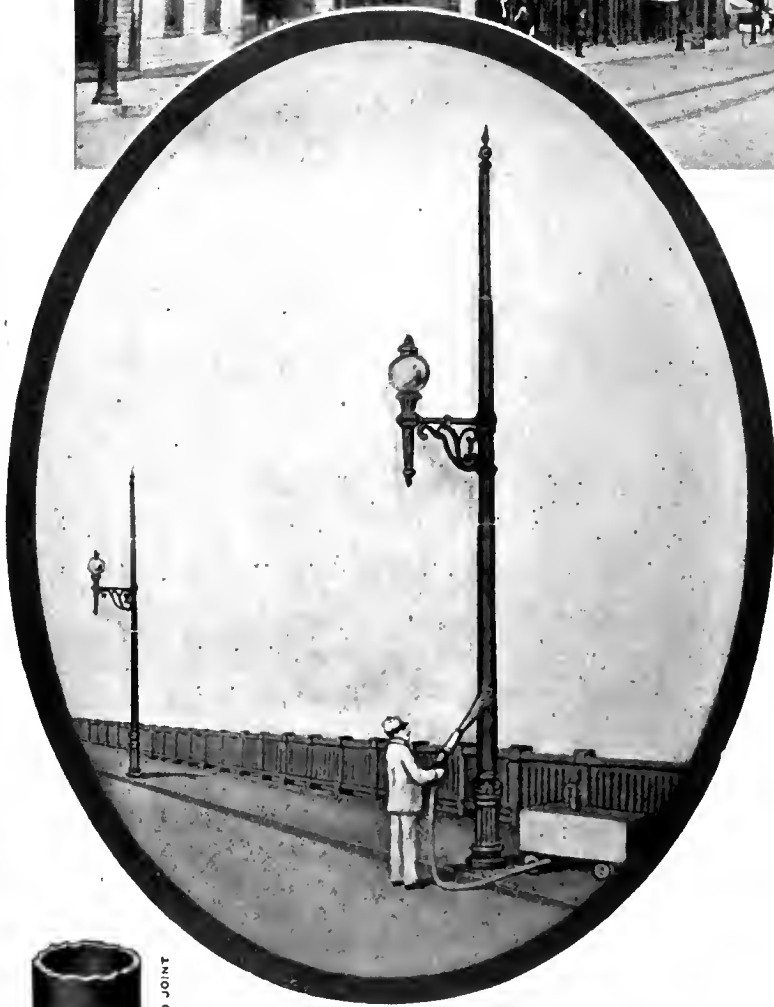
Pittsburgh

Chicago

Los Angeles

San Francisco





# ELRECO Tubular Combination Poles

helped make a "White Way" for Negaunee, Michigan.

As the picture clearly shows, every other trolley pole carries a lamp bracket—doing away with separate poles and the extra cost of their installation.

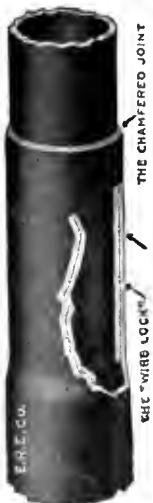
Elreco Poles can never telescope, no matter how heavy the strain on the wires. The "wire-lock" swedge joint positively prevents slipping. And the chamfered joints prevent rust.

Write today for catalog of the complete Elreco line.

## Elreco Tubular Poles

Combine

Lowest Cost  
Lightest Weight  
Least Maintenance  
Greatest Adaptability

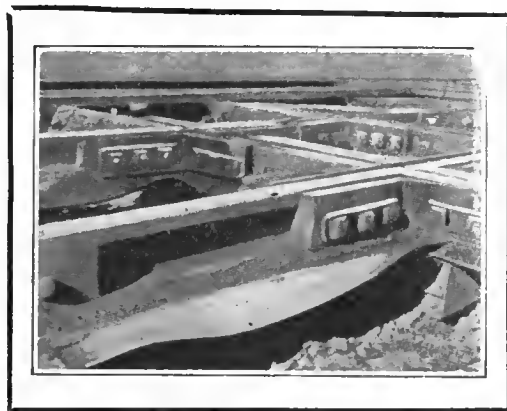


## ELECTRIC RAILWAY EQUIPMENT CO.

CINCINNATI, OHIO  
New York: 30 Church Street



# 176 Cars an Hour One Way 10 the other way—18-hour service



## —on this crossing laid on special International Steel Foundation

The man who hails from Denver knows the busy intersection at Curtis and Fifteenth streets.

176 cars an hour one way—10 cars an hour the other—and this for 18 hours a day.

Recently a new crossing was laid here. The outstanding feature of the work was the type of square crossing used. It was made up with 100-lb. rail and man-

ganese flange-bearing risers and exceptionally heavy knee irons. The squares, which weighed 5000 lb. each, were laid on a crossing foundation of special type built by this company.

No matter how good the crossing, it is the foundation that will make it or break it.

And the same holds true of ties—the foundation of your track.

Let us give you full particulars of International Steel Ties and Specials. Prompt deliveries made from stock.

Permanent Track at Less Cost  
Any Type Base — Open or Paved Track

## The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

Representatives:

Western Eng'g Sales Co.,  
Los Angeles, Cal.

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Seattle, Wash.

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Dallas, Texas.

Maurice Joy,  
Philadelphia.

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Minneapolis, Minn.



# Phono-Electric

reports read, "Still Up"

Almost monotonous—that phrase "Still up" about so many installations in Philadelphia, one of the great Phono-Electric cities.

For instance, 2 miles of No. 0000 trolley wire have been up on Third Street between Brown and Reed ever since October, 1909.

It would mean much to your line department, to your rolling stock department and to your transportation department to network your city with a trolley wire that is good for double the life and many times the reliability of hard-drawn copper.

Continuity of service begins at the top with a wire that represents continuity of quality.

For Phono-Electric is Phono-Electric to the core. Besides possessing exceeding strength, ductility and toughness it possesses all these characteristics throughout its entire compass—not merely in its skin or surface.

**Bridgeport Brass Company**  
**Bridgeport** **Connecticut**



# KEYSTONE

## Car Specialties

Right now, of all times, give your patrons full measure of service.

Give them good interior car lighting with "Safety" Car Lighting Fixtures.

Give them Faraday High Voltage Car Signal Systems so that they can easily signal motormen to stop.

These Keystone Specialties are designed to benefit you as well as your patrons.

*Write for complete data.*



Typical "Safety"  
Car Lighting Fixture



*Faraday High Voltage Car Signal Systems*

## ELECTRIC SERVICE SUPPLIES Co.

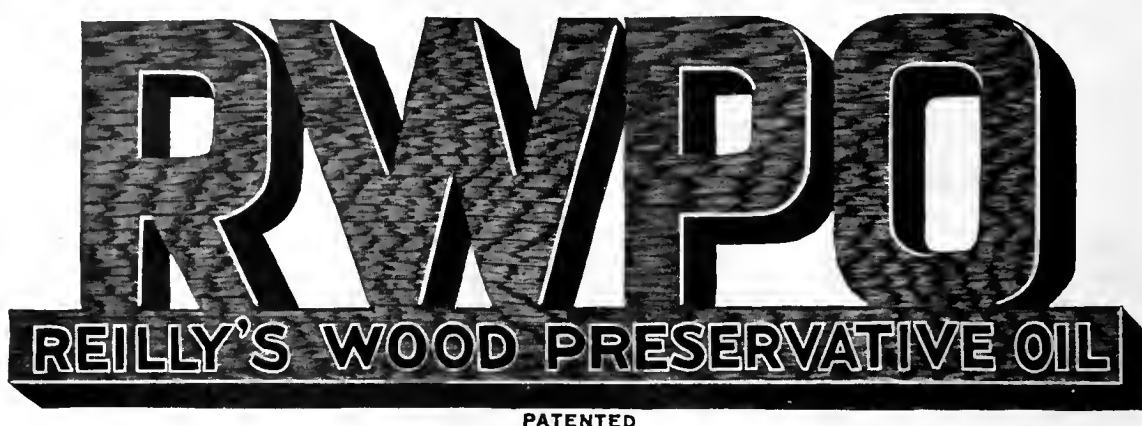
*Manufacturers of Railway Material and Electrical Supplies*

PHILADELPHIA  
17th and Cambria Sts.

NEW YORK  
50 Church St.

CHICAGO  
Monadnock Bldg.

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg.



## Permanently Prevents Timber Decay

**W**HATEVER use you make of wood—whether for poles, cross arms, mine timbers or any other purpose—you can insure the good condition and long life of that wood by treating it with Reilly's Wood Preservative Oil.

**R. W. P. O.** penetrates deeply into the wood and **STAYS** there. It cannot dissolve or evaporate. Once it is applied, the wood is protected against decay and insect attacks.

Do not waste time, labor and lumber when you can avoid it by using **R. W. P. O.** The cost is trifling, the application is easy; and the results are positive, profitable and permanent.

Do not accept substitutes. There is nothing "just as good." Demand **R. W. P. O.** and you'll get the very best and the service and satisfaction that goes with it.

### Republic Creosoting Company

Indianapolis, Indiana

Plants: Indianapolis    Minneapolis    Seattle    Mobile



## *For Moving Big Crews Quickly*

Study the above photograph and you'll begin to get some idea of what MUDGE MOTOR CARS mean in crew transportation. Whether for emergency or regular crew service, they are always ready, always reliable, powerful, safe and sure. Easy to put on rails; easy to take off. No switching and no delay to traffic. Cheap to operate and maintain.

# MUDGE

## MOTOR CARS

are built in a variety of types and sizes to meet every requirement and every condition. Numerous exclusive patented features of safety and

operation make MUDGE CARS most efficient for rapid transportation of workmen independent of the regular service equipment. Used extensively by the leading railways of the country.

Write or Wire for Our Complete Catalog.



## Mudge & Company

464 Railway Exchange,

Chicago, Ill.







# BETTER TRACKS at Less Cost

## Can Be Laid

by using  
D.M. Ties all  
the way!

**Permanent—  
Resilient—  
Economical.**



## Are the Result

of careful  
construction.

And the best and most  
careful method known  
so far is that of using  
D.M. Ties.

And these  
Ties have  
Made Good  
with a ven-  
geance.

Dayton Mechanical Railway Ties are not only a **theoretical** solution of track troubles. They are the **practical** outcome of years of work and tests on track carrying both city and heavy, high-speed, interurban cars.

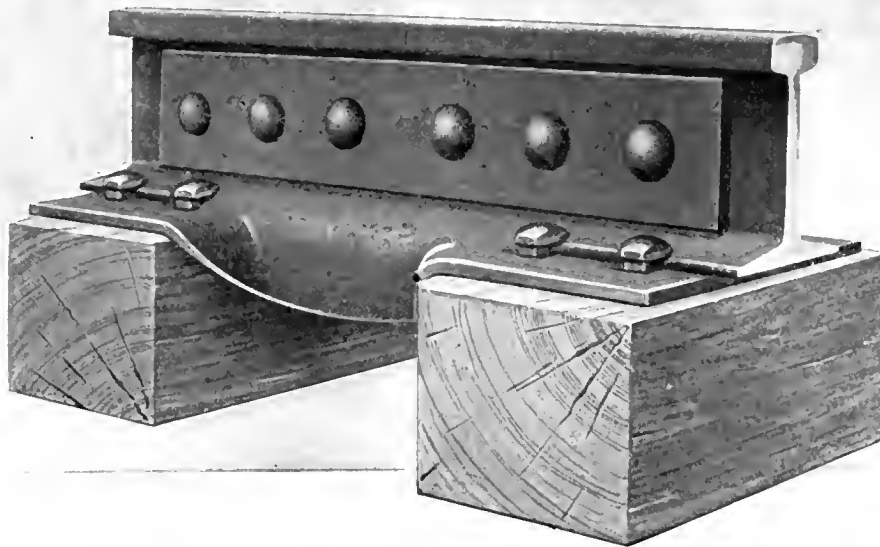
Write for full  
particulars.



THE DAYTON MECHANICAL TIE CO.  
201 Third Street Arcade  
DAYTON, OHIO



## For PERMANENTLY good rail joints, weld FLAT-ENDED ABBOTT PLATES to the rail bases



This recently developed and inexpensive joint construction for use especially with high T or girder rails laid in paved streets consists in welding the Flat-ended Abbott Plate to the rail flanges and riveting the splice bars to the web.

Standard high T splice bars which fit the fishing angle, or plain flat bars having no contact with head or flange of rail, may be used with perfect safety, as the bars do not carry any of the load. The welding is easily accomplished without the use of expensive equipment, and may be applied only to the part of the rail base between the ties or may extend the entire length of the plate.

Track equipped with this type of joint gives full sectional contact of the rail ends, maintains its surface perfectly and the rail ends are held together so tightly that the joint becomes invisible on the wearing surface. *The welding gives an absolute electrical bond and eliminates the necessity of special bonding.*

The flat end surfaces of this type of Abbott Plate leave the joint clear so that the paving can be made to fit up against the track without having to use special blocks or bricks.

This and other shapes of Abbott Rail-Joint Plates are fully described and illustrated in our booklet "*Improved Track Appliances.*" which will be sent on application.

311



THE ABBOTT RAIL JOINT PLATE  
"BUILT LIKE A BRIDGE"

### Lackawanna Steel Company

LACKAWANNA, N. Y.

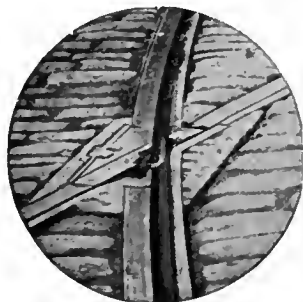
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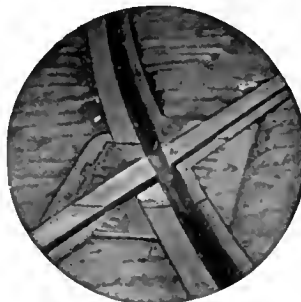
# RECLAIMED PIECES

## Still Do Their Bit

Hard Center Frog  
in badly battered  
condition.

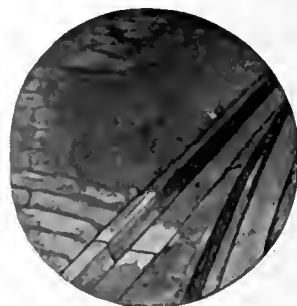


The Same Frog  
after it had been  
welded by our  
welder.



A Broken Switchpiece  
which looks as if its  
days of service were  
past.

The Same Switchpiece  
after our Welder got  
through with it.



## These Jobs Were Done in 1912!

Many — in fact, the majority of such jobs — are still doing good work, still giving good service, still doing their bit, thereby relieving the situation as far as new materials are concerned.

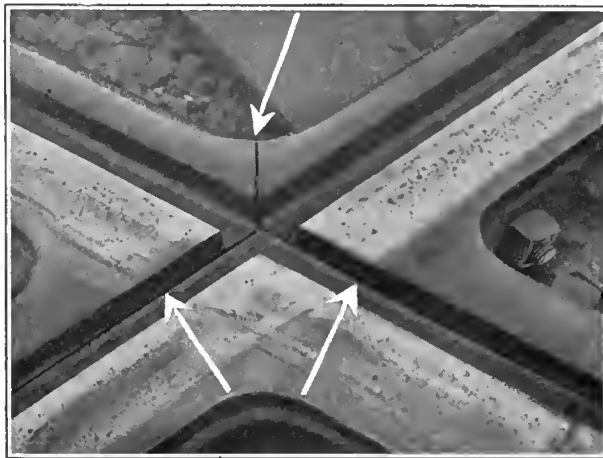


Indianapolis Welders are *cheap*, for the first cost of the equipment is paid for inside of 60 days—and the operating costs, including labor, current and steel, amount to only 1% to 2% of the value of the reclamation.

**Indianapolis Switch & Frog Company**  
Springfield, Ohio



What Happens to a Rolled Rail Crossing



Joints In Balkwill Articulated Cast Manganese Crossings are life savers. They positively prevent breakage at flangeway intersections, permitting 100% wear before renewal

## Why Balkwill Articulated Cast Manganese Crossings Are Superior to Rolled Rail Crossings

This picture at the left shows where breaks in the main steel filling or backbone of rolled rail crossings are usually found.

These breaks are unavoidable because of the lack of flexibility of the rolled steel filler at the flangeway intersection.

In the Balkwill Articulated Cast-Manganese Crossing the difficulty is

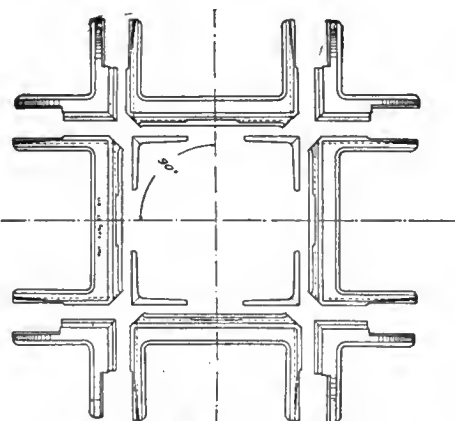
corrected by placing scientifically designed joints at the very places where breakage formerly occurred.

The lower first cost of a rolled rail crossing is therefore not a lower overall cost because it takes several rolled rail crossings to equal the life of one Balkwill Articulated Cast Manganese Crossing. Therefore the Balkwill Crossing is the cheapest in the long run. It gives

### MORE WEAR PER DOLLAR THAN ANY OTHER CROSSING YOU CAN BUY

It saves interruptions to traffic, makes less demand on labor, which is now so scarce, and also reduces the cost of making replacements frequently.

Write us for data on existing installations. If your special work manufacturer cannot get prompt deliveries of manganese castings or has not taken out a license to manufacture these crossings, **DON'T ACCEPT A SUBSTITUTE** but write us direct and we will see that your requirements are taken care of.

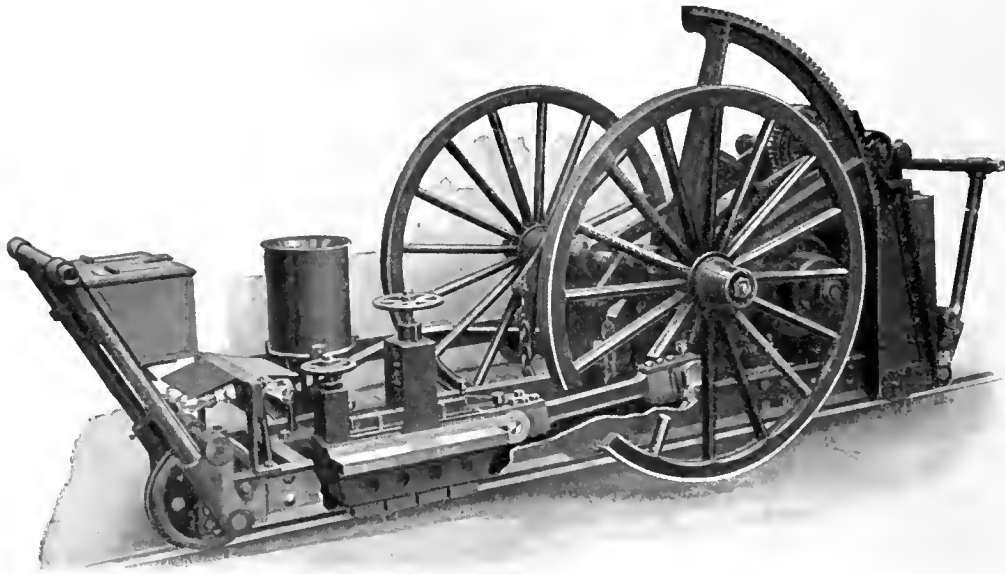


Joints at the flangeway intersections of Balkwill Articulated Cast Manganese Crossings positively eliminate breakage

Order Balkwill Articulated Cast Manganese Crossings  
Direct from Your Special Work Manufacturers

# The Balkwill Manganese Crossing Co.

506 Williamson Building, Cleveland, Ohio



# *It Saves Money in BIG Sums*

The electric railway companies which have been using the

## **Reciprocating Track Grinder**

and have definitely figured the results achieved are keenly appreciative of the fact that the savings due to this machine are *big* savings. That the savings made represent not merely an adequate return on the investment, but that they quickly repay the investment and roll up a net profit of comfortable proportions.

These quick and large savings have been especially apparent where properties have had sections of track deteriorate to such an extent that entirely new track seemed to be the only remedy.

In many such cases the Reciprocating Grinder has made the old track serviceable for years at a *fraction* of the cost of new track.

The Reciprocating Track Grinder has saved a *lot of money* for the electric railway industry.

It will save money on your lines if you give it the chance.

### **RAILWAY TRACK-WORK COMPANY**

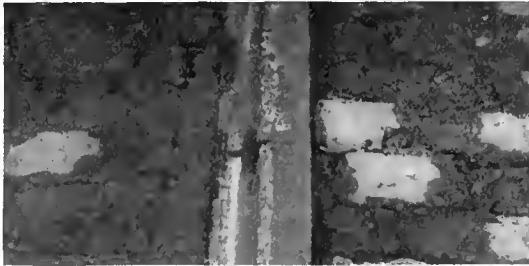
30th and Walnut Streets, Philadelphia

AGENTS: Holden & White, Inc., 343 S. Dearborn St., Chicago. Wigmore, Hall & Co., Pacific Electric Bldg., Los Angeles, Cal.

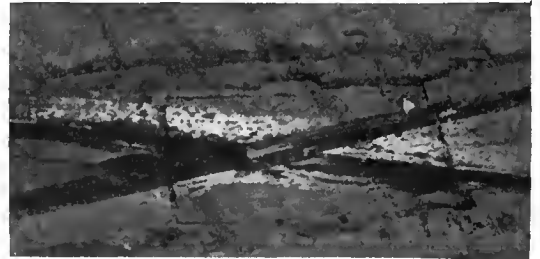




# The Life of Your Rails



Cupped Rail repaired by building on new material with the Lincoln Arc Welder



Manganese cross over points, built up by arc welding. Such repairs have stood years of service

Increase the life of your track by filling in those cupped and corrugated rails with a

## Lincoln Arc Welder

Worn rails mean increased repair bills in the car barns—more strained frames—more loose rivets—more broken pinions, armature shafts and axle caps—more jolting of the cars—more

complaints from passengers. Side-track your track troubles and save 60% on repair bills for your company by using the LINCOLN ARC WELDER.

*Our Booklet 104-J gives full details of the Lincoln —“why,” “how” and “how much saving.”*

## The Lincoln Electric Co.

Cleveland, Ohio

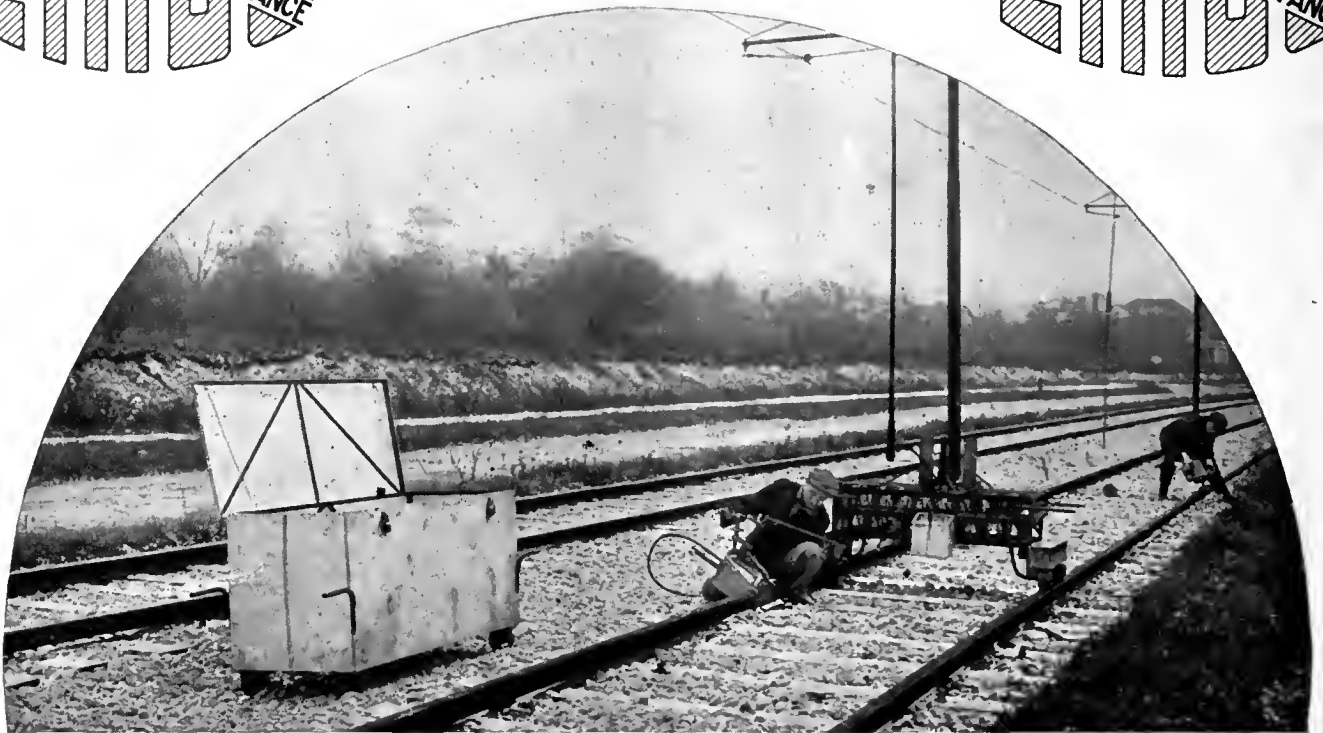
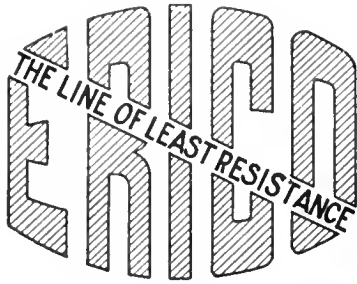
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Minneapolis

Philadelphia  
Charlotte, N.C.  
Toronto  
Montreal

Agencies in Other Principal Cities





# The ERICO Portable Welder

## For Rail Bonding

### What They Say about it—

*Manager—“Inexpensive.”*

*Engineer—“Good bonding.”*

*Return Circuit Dept.—“Saves man power.”*

*Operating Dept.—“No interruption to traffic.”*

*Bonding Foreman—“Easy to handle.”*

This outfit makes everybody feel good because the bonding is done easily and economically, and the operating department is pleased by having good voltage that enables them to maintain schedules. Take one and see.



**The Electric Railway Improvement Co.**  
Cleveland

# HOW'S YOUR COAL PILE?

Last winter the cry was coal  
What are you doing about next winter?  
We have the answer

We are remodeling old boiler rooms and installing coal and ash handling machinery in many existing plants to meet the labor and fuel shortage.

Send sketches of your boiler room layout and we will tell you what can be done and how much it will cost. We are solving 50 problems such as yours every month.

One contract covers everything—designing, furnishing of all materials and erecting.

Catalog 20 shows some of our installations. Booklet 32 tells about Skip Hoists for economical ash handling in large plants.

## R. H. BEAUMONT COMPANY

111 So. Fifth Street, Philadelphia, Pa.

NEW YORK: 50 CHURCH STREET

BOSTON: 141 MILK STREET

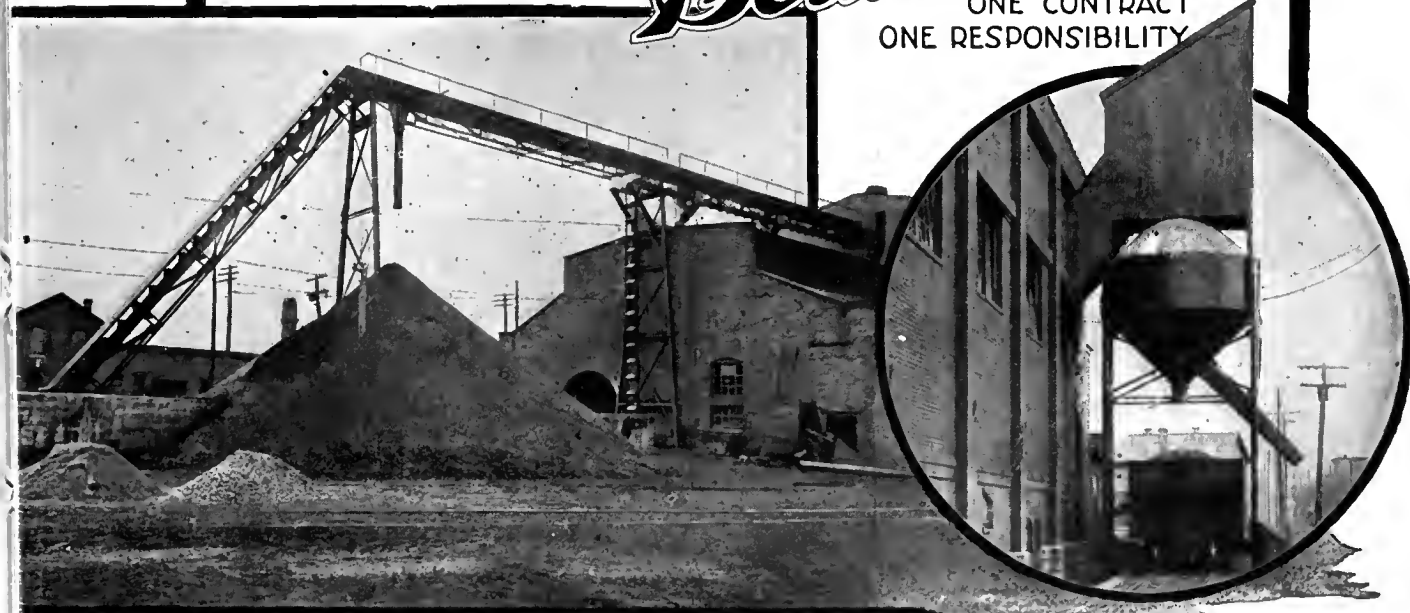
*Specializing in Coal, Ashes and Coke  
Handling Equipment for Boiler and Gas Houses.*

Coal and Ashes Handling Apparatus.  
People's Railway Co., Dayton, O.

A flight conveyor delivers coal from crusher to a run-around V-bucket elevator-conveyor. The latter runs over bridge, delivering coal to pile, and returns through concrete tunnel, reclaiming it and delivering to the suspension bunkers. A swing chute increases radius of pile. Capacity of bunkers, 80 tons.

A dump car takes ashes from pits and discharges into bucket of skip hoist. Capacity of ash bunker, 1200 cubic feet.

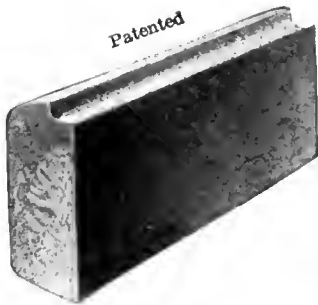
*Beaumont*  
ONE CONTRACT  
ONE RESPONSIBILITY



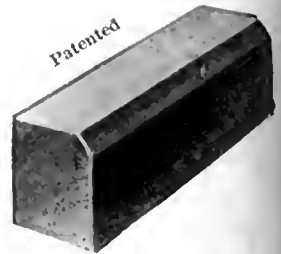


# Nelsonville

*Filler and Stretcher Brick*  
is the standard of the  
*CORPUS CHRISTI* Rail-  
way and Light Company.



**Nelsonville  
Filler  
Brick**



**Nelsonville  
Stretcher  
Brick**

Let us  
send  
you a  
copy  
of—  
"Rail Brick  
of the  
right  
sort."

Nelsonville Filler and  
Stretcher Brick is  
worth the attention of  
every live Railway  
which is anxious to

*Secure Economical Track  
Construction and Lower  
**PAVING UPKEEP***

## THE NELSONVILLE BRICK CO.

Nelsonville, Ohio

# IMPERIAL

## WELDING CUTTING

### EQUIPMENT

## Maintain Your Schedule and Your Profits

Keep your cars constantly busy—remember that idle rolling stock reduces profits. Place Imperial Welding and Cutting Equipment in your repair shops and save time and money when breakages occur.

An Imperial Outfit can be easily operated by any of your mechanics; it bonds and welds metal parts of all kinds, cuts steel rails, car frames, etc., and builds up cupped joints, crossings, worn frogs, etc., without interrupting traffic.

Safe, Speedy, Economical and Efficient, Imperial Equipment is durable and dependable. It is portable—always ready for use anywhere, and often pays for itself through a single operation.

The wonderful Imperial Mixing Principle regulates and accurately controls delivery of gas and prevents backfire, so dangerous to the operator. Imperial Equipment is today a real industrial necessity.



*Cutting 9-in. Shaft with Imperial Cutting Torch*

Write today—our expert engineers will advise you, free of charge, as to the kind of equipment best adapted to your needs.

**The Imperial Brass  
Manufacturing Co.**

525 S. Racine Ave.  
Chicago, Ill.





# Armature and Field Coils



*Of course we are making them!*

Columbia-made armature and field coils have many years of experience behind them and many years of service satisfaction before them!

Our coils are made in accordance with the latest impregnation and insulation standards at a price and of a quality that make home manufacture needless.

## Get Ready Now for HEAVY SUMMER SERVICE

We can help you keep all the cars on the line when every car-hour means revenue, if you write or wire us about your needs now. A large stock of coils is ready to move your way the moment you say so!

*No doubt you want other Columbia-made products too, such as shown in lists below.*

## Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St.

Brooklyn, N. Y.

W. R. Kerschner Co., Inc., N. Y.  
Holden & White, Inc., Chicago  
F. F. Bodler, San Francisco  
Railway & Power Eng. Corp., Ltd., Toronto, Can.

### TOOLS

Armature and Axle Straighteners  
Armature shaft straighteners  
Armature buggies and stands  
Babbiting molds  
Banding and heading machines  
Car hoists  
Car replacers  
Coil taping machines for armature leads  
Coil winding machines  
Pinion pullers  
Pit jacks  
Signal or target switches  
Tension stands

### CAR EQUIPMENT

Armature and Axle Bearings  
Armature and field coils  
Bearings (Axle and Armature)  
Brush-holders and brush-holder springs  
Brake, door and other handles  
Brake forgings, riggings, etc.  
Car trimmings  
Commutators  
Controller handles  
Forgings of all kinds  
Gear cases (steel or malleable iron)  
Grid resistors  
Third-rail shoe beams and accessories  
Trolley poles (steel) and wheels



*The motorman  
sees what he  
saves!*

**BECAUSE—**



*"The Watchdog of Your Power"*

*The ECONOMY Meter is an Open-Face Device.  
Its Readings Show Both the Management and  
the Motorman What Progress He is Making.*

There is no mystery about the ECONOMY Meter method of saving energy. The device is **open face**. The figures are there in plain sight, as simple and as readable as the figures on a cyclometer.

This is getting to the very fundamentals of energy checking and saving—a direct reading of the propulsion power actually consumed.

The ECONOMY Meter actually measures what the motorman is trying to save. He sees his own records at any time. He learns **HOW** to save energy, by proper acceleration, proper coasting and proper braking and he observes his progress.

There's nothing like showing him in actual figures the precise effect of indifferent handling of controller and brake.

The open-face feature, furthermore, **appeals** to the motorman. He takes his own readings. He "writes his own power bills," and he constantly strives for a record, or at least to better his previous performance. The reminder that he is being rated is salutary in itself.

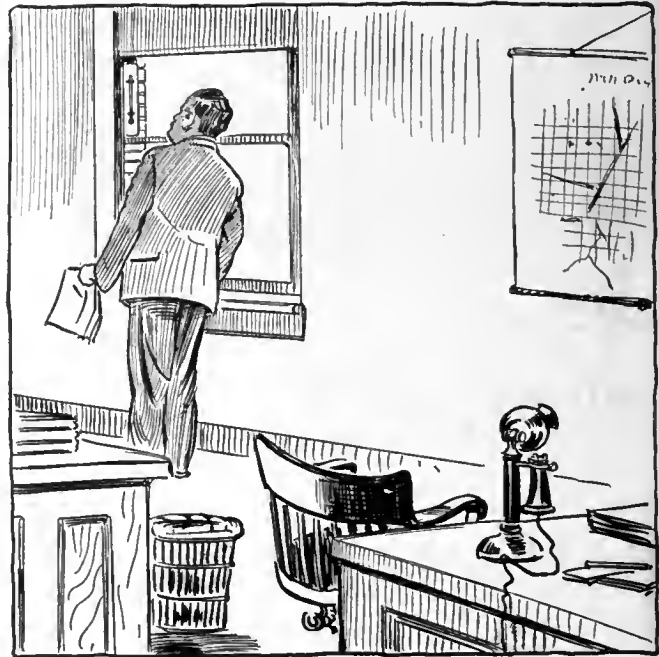
In addition to the above advantages, ECONOMY Meters will produce data of great value to the engineering department, assisting it in choice and maintenance of equipment. It will also yield information which will be valuable to the transportation department in taking slack out of schedules.

The matter of initial investment is of prime importance. We invite your consideration of this feature particularly, in connection with our device.



L. E. Gould, Pres.

# Some Roads Regulate The Heating of Their Cars THIS Way!



The dispatcher or superintendent with his many other important functions must watch the thermometer.

If it rises, he orders a different heating "point" signaled to the cars.

If it drops, he again changes the "point."

The signaled orders may be seen and they may not. They may be carried out and they may not.

The dispatcher or superintendent, *indoors*, must be constantly on the alert to observe atmospheric changes *outside*.

All this uncertainty means possibility of not only unsatisfactory heating of the cars, but even with the utmost vigilance, it may mean and unquestionably does mean, a big loss in wasted heating current, which could be saved by use of



## THE UTILITY Heater Regulator

Compare the "human factor" method described above, with the positive, never-failing, "sleepless brain and tireless hand" of the Utility Heater Regulator.

It is never "off the job" for a moment, day or night. The instant the heat in the car reaches a certain temperature, the Utility Thermometer Control automatically shuts off the heating current.

The moment the temperature drops to a given point, the heating current automatically comes on again.

No cold cars. No complaints. No overheated cars. No wasted current. No opportunity for anybody to overlook or disregard requirements.

If a car is crowded with passengers it is naturally much warmer. The Utility Thermometer Control at once takes advantage of this heat and shuts off the heating current.

Do you realize, Mr. Railway Manager, that this device can save you up to 70 per cent. in heating energy—current which may now be going to waste?

Among its advantages are: Practically no upkeep expense. Extremely sensitive to temperature change. Unfailing in accuracy. Fool proof. All parts interchangeable. **ABSOLUTELY SAFE** (proof against shock). **ABSOLUTELY UNAFFECTED BY VIBRATION**. Sold subject to payment by January 1st, 1920.

*Why wait? Why not install NOW, and benefit by weather changes at once?*

## RAILWAY UTILITY COMPANY

151 West 22nd Street

Chicago, Illinois

J. H. Denton, Eastern Manager, 1328 Broadway, New York.

O. W. Meissner, Representative, 10 St. Antoine St., Montreal.

F. O. Grayson, Representative, 600 La Salle Building, St. Louis, Mo.



## Buffalo's Latest Peter Witt 130 in all are National Pneumatic Throughout

To promote the efficiency of the conductor,  
National Pneumatic Sliding Door Type Engines.

To promote the efficiency of the motorman,  
National Pneumatic Folding Door Type Engines.

To protect life and limb of the passenger,  
National Pneumatic Safety Interlocking Door  
Control.

To prevent loss of time between conductor and  
motorman, National Pneumatic Motorman's  
Signal Lights.



### Modern Train Operation is Provided for

by engine control features which enable the conductor of the leader car to control the front folding doors of the trailer; and door interlock features which prevent starting, and burning of motorman's signal until all doors of the train are closed.

**TO GET MOST MONEY MILEAGE**

from your present or future cars

Specify

**National Pneumatic Control and  
Safety Equipment.**

# NATIONAL PNEUMATIC COMPANY

INC.

50 Church St. New York



515 Laflin St. Chicago



Ticket Side Type  
C17 Coin and Metal  
Ticket Fare Box

# International Coin Registers

Permit Easier Employment of  
**WOMEN**

Through eliminating cords and rods



Cash Side Type C17  
Coin and Metal  
Ticket Fare Box

It's getting harder and harder to get men conductors because Uncle Sam needs the big, sturdy fellows for war and munition service.

That leaves you women and undersized men to pick from.

But the average woman is also short and cannot conveniently reach a bell cord or rod.

That won't worry you when you install International Coin Registers, the

## Fare Box and REGISTER in One

because every fare that goes into the box can be counted and registered merely by turning a handle or even through motor operation—

While the transfer and other paper can be registered very easily by means of a pull rope of any convenient length.

**The International  
Register Company**

15 South Throop St., Chicago, Ill.



Metal Ticket and  
Type C20 Coin,  
Transfer Register



Motor-  
Driven  
Type C25  
Coin  
and Transfer  
Register



SKF

BALL BEARINGS



AUSTIN, TEXAS



PEKIN, ILL.



Car on the Austin Street Railway equipped with G. E. No. 258 Motor.

City of Pekin Car equipped with G. E. No. 258 Motor.

# Lubrication of Motor Bearings

During the severe weather of last winter many railway companies experienced considerable difficulty with plain bearings on electric motors, due to the fact that the lubricant froze and the bearings subsequently burned out, allowing the armature to drop upon the pole pieces. As ball bearings do not depend upon a film of lubricant to separate the bear-

ing surfaces this trouble could not have occurred in ball bearing motors.

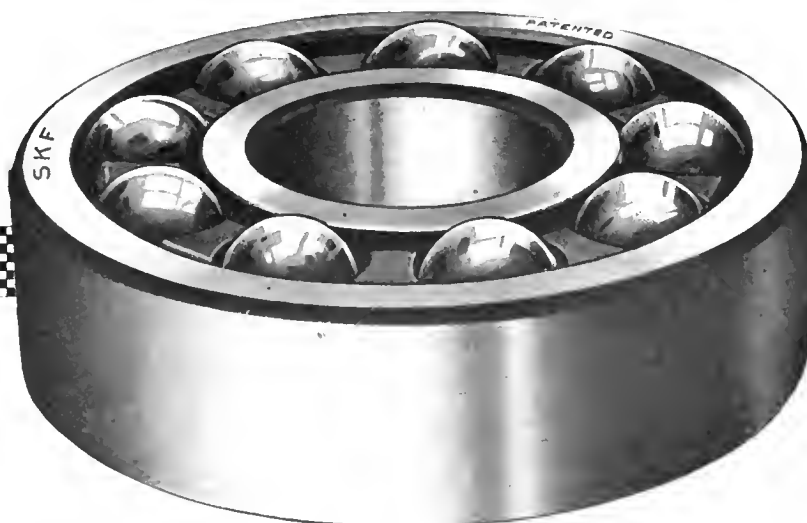
If your street railway motors are SKF equipped you can run 10,000 to 15,000 miles without lubricating your motors and you will have the assurance that they will run satisfactorily without constant attention.

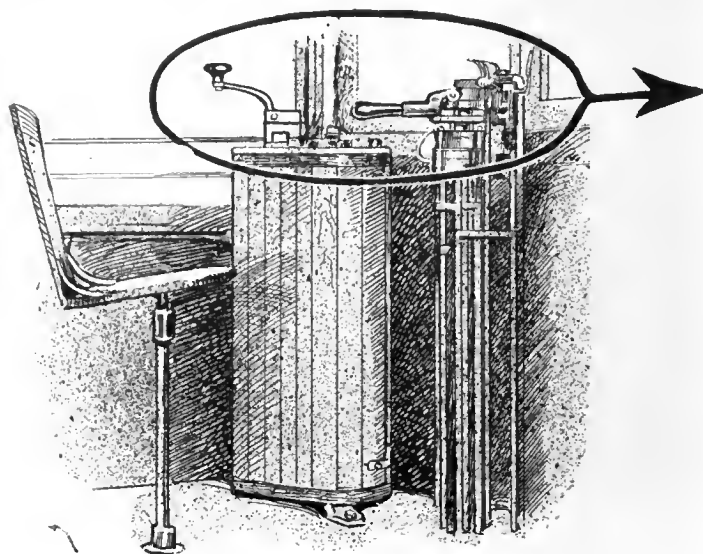
HARTFORD

**SKF BALL BEARING CO.**

CONN.

370





A Big Proportion  
of Your Operating  
Expenses Depend  
Upon How These  
Are Used—



Checks Motorman  
at Controller

and This *Shows*  
Whether They are  
Well or Badly Used

Checks Motorman  
at Brakes

The solution of every problem in efficiency of operation in any business eventually gets back to the human element—the efficiency of *the man*.

How can you expect to secure the best results in the operation of cars and the use of power and equipment unless you have some means of determining whether or not you *are* getting it?

## The Arthur Power-Saving Recorder

enables you to determine whether the operation of your cars is as good—as safe—as economical as it can be made.

It does more than that. It enables the motorman to see for himself how good his work is and assures him that superior care, skill and intelligence will be definitely recorded.

Used as a basis for securing better car operation—it pays for itself over and over again and returns big dividends on its relatively small cost.

It is simple, requires no live wires—no switches—no shunts—no resistances. It costs little to install and its maintenance is almost nil.

It is certainly worth your while to know definitely what it can do for you in promoting economy, safety and efficiency.

**The Arthur Power-Saving Recorder Co.**  
Second National Bank Building, New Haven, Conn.

*“Power wasted is the true measure of the motormen’s relative efficiency”*



When this picture was taken, Minneapolis had just been incorporated as a town, and its history properly ought to be dated from 1856. Only two years previously the first suspension bridge in the U. S. and the first bridge of any kind to span the Mississippi was built by the village of Minneapolis.

THE BUSINESS CENTER OF MINNEAPOLIS IN 1857

## The Real Estate Boom

following the incorporation of the town nearly swept the "boomers" off their feet. Within two years the city had gained six times in area, had two large hotels and so much building work that the big saw mills on St. Anthony Falls were overwhelmed with local orders. Then came a financial panic, an Indian uprising and the young city stood face to face with financial ruin.

But when things looked blackest—the "railroads came to town" and injected new blood into its people. The "Mill City," as it came to be called, showed a recuperative power that surprised the country. Transportation of freight and of passengers became faster and safer from

year to year; the city's industries grew in leaps and bounds and thousands of workmen's and merchants' homes sprang up everywhere.

The steam roads—the big arteries of traffic—swept by, only touching the city at the big depot, but from its center to the outlying districts there radiated lines of street railways which carried the passenger traffic into the highways and byways of the spreading town and solved its housing problem.

And as the street cars helped build the town and solve its traffic and housing problems, so

## Galena Oils

and Galena Service have helped and still help to solve the many new problems in lubricating fast-moving machinery and cars.

Galena Oils are not merely a name and trademark representing a certain brand of oil good for railroads and trolley cars, but the visible result of half a century's close co-operation with these transportation factors in the solution of lubrication questions.

**Galena-Signal Oil Co.**  
Franklin, Pa.



# DURADUCT

(Reg. U. S. Patent Office)

## Standard at Nashville for All Conduit Wiring of New Cars

The Nashville Railway & Light Company was a pioneer in the use of Duraduct, its first lot having been purchased for a home-built car in 1913.

It has been applying Duraduct on all new cars ever since—the latest being nine new double-truck cars, also built at Nashville. And the user says:

**“Satisfactory in Every Way”**

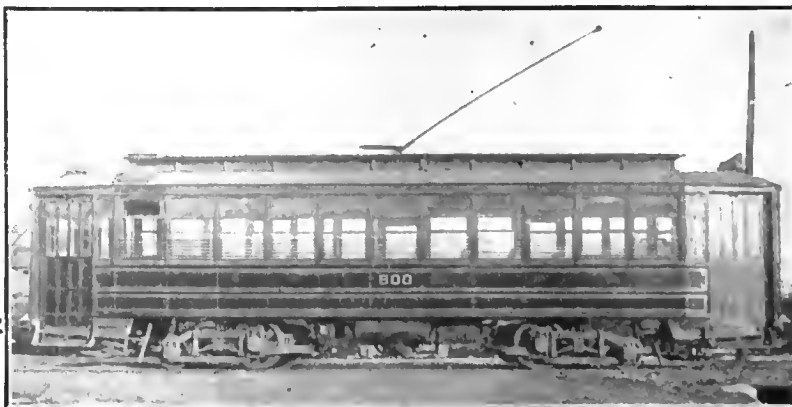
Duraduct is also the standard conduit on the famous Stone & Webster Safety Car.

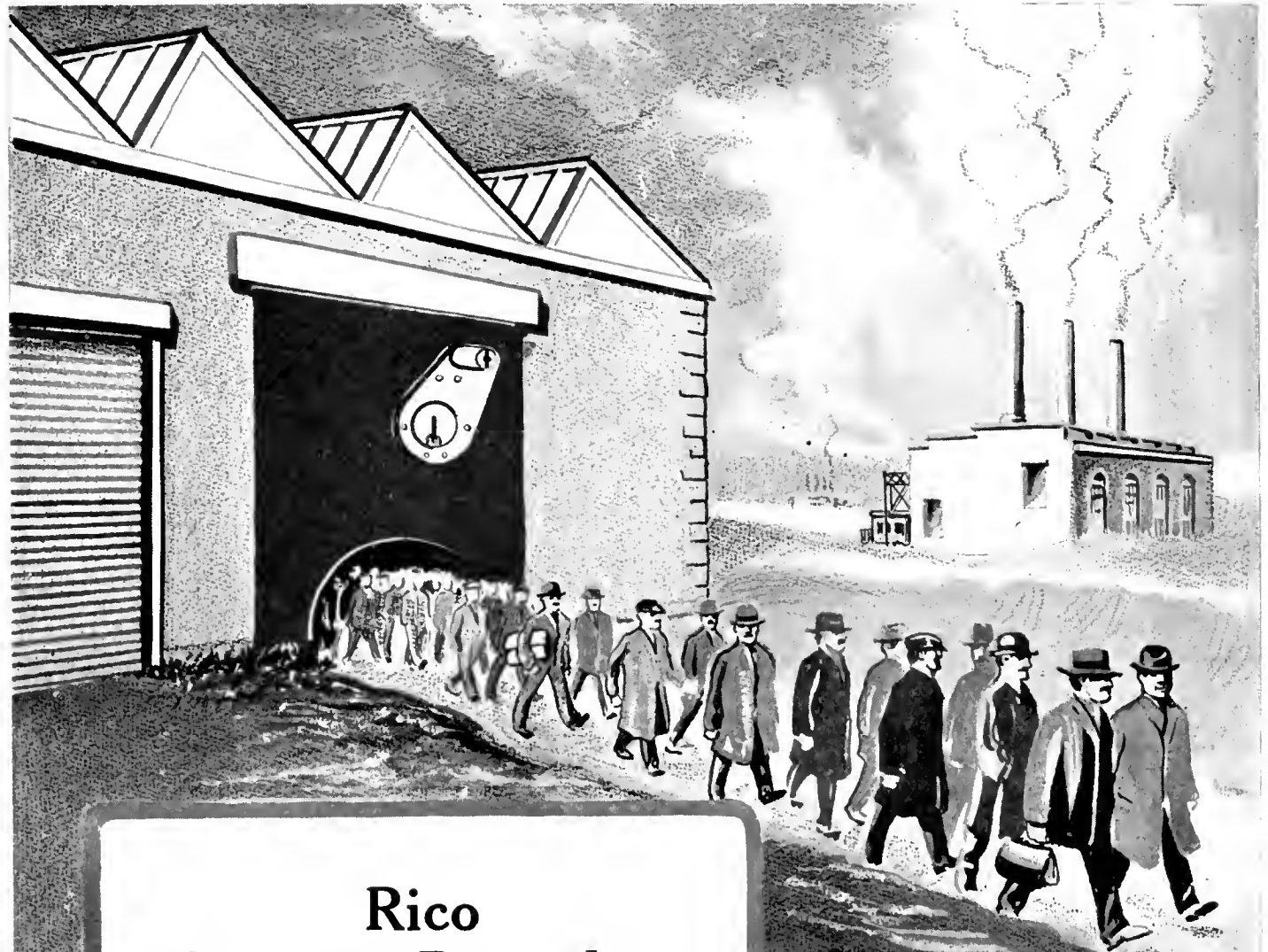
**TUBULAR WOVEN FABRIC COMPANY**  
MANUFACTURERS — PAWTUCKET, R. I.  
GENERAL SALES AGENT — A HALL BERRY

71-73 Murray St., New York

9 So. Clinton St., Chicago

*Northern Electric Company* Distributors for Canada  
UNITED





## Rico Coasting Recorders

Prevent Waste of  
Man Power

At the power plant, 10 to 20 per cent. fuel reduction through scientific coasting of the cars saves in the labor force of the boiler room.

In the shops, the correct operation of cars taught by the Rico Coasting Recorder, and the resulting reduction in maintenance, saves both electrical and mechanical labor.

In the transportation department every car eliminated through reducing slack in the line saves an average of two crews a day.

Don't let the matter of financing the purchase of Rico Coasting Recorders worry you. We will be glad to assist you.

**FUEL and LABOR  
CONSERVATION  
WILL HELP WIN  
THIS WAR**



# Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO.



61 BROADWAY, NEW YORK





**HELP OUR TOWN  
WIN THE RIGHT  
TO FLY THIS FLAG**

**HONOR FLAG  
3<sup>rd</sup>  
LIBERTY LOAN**

**AWARDED BY THE UNITED STATES TREASURY  
DEPARTMENT TO TOWNS EXCEEDING THEIR QUOTA**

## Street Cars Telling the Message of the Liberty Loan Flag

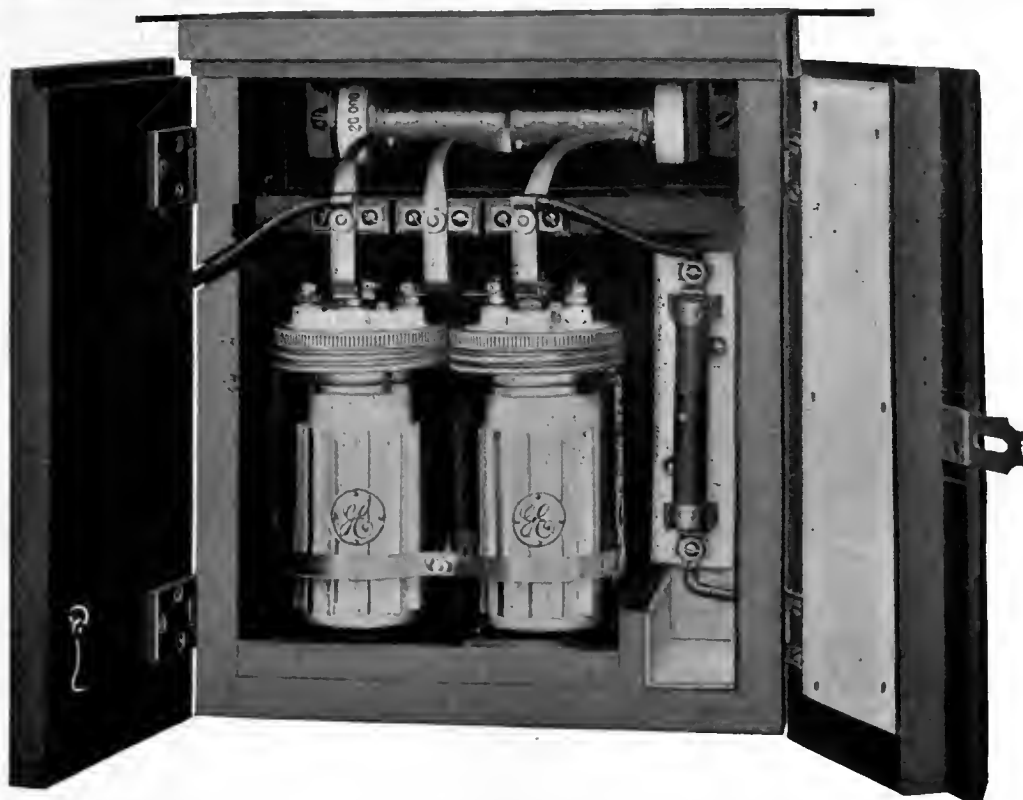
**A**BOVE is reproduced in one color the street car card featuring the Official Flag of the Third Liberty Loan. This Honor Flag is awarded by the United States Treasury Department to towns exceeding their quota.

The contributing car advertising companies were pleased to have their medium selected to herald this scheme to the people of the United States, several days in advance of the Loan. On the opening day of the Loan this flag card was replaced by a series of other cards making a stirring patriotic appeal.

**Barron J. Collier**  
**INCORPORATED**

Candler Bldg.  
220 W. 42nd Street, New York City





## Losses From Lightning Are Preventable



## ALUMINUM Lightning ARRESTERS

The G-E Aluminum Arrester for electric railway service has proved for years that it will protect against lightning. It is an electrolytic safety valve and an aluminum condenser in one. It is easy to install and is economical in upkeep.

Roads that have installed these arresters have been practically immune from lightning troubles. They have given better transportation at less cost to themselves.

We have a stock on hand but transportation is uncertain. Order now to get the highest class protection during 1918.

# General Electric Company

Atlanta, Ga.  
Baltimore, Md.  
Birmingham, Ala.  
Boston, Mass.  
Buffalo, N. Y.  
Butte, Mont.  
Charleston, W. Va.  
Charlotte, N. C.  
Chattanooga, Tenn.  
Chicago, Ill.  
Cincinnati, Ohio  
Cleveland, Ohio

Columbus, Ohio  
\*Dallas, Tex.  
Dayton, Ohio  
Denver, Colo.  
Detroit, Mich.  
Des Moines, Iowa  
Duluth, Minn.  
Elmira, N. Y.  
Erie, Pa.  
\*El Paso, Tex.  
Fort Wayne, Ind.  
Hartford, Conn.

General Office: Schenectady, N. Y.

ADDRESS NEAREST CITY

\*Houston, Tex.  
Indianapolis, Ind.  
Jacksonville, Fla.  
Joplin, Mo.  
Kansas City, Mo.  
Knoxville, Tenn.



Los Angeles, Cal.  
Louisville, Ky.  
Memphis, Tenn.  
Milwaukee, Wis.  
Minneapolis, Minn.  
Nashville, Tenn.

New Haven, Conn.  
New Orleans, La.  
New York, N. Y.  
Niagara Falls, N. Y.  
\*Oklahoma City, Okla.  
Omaha, Neb.  
Philadelphia, Pa.  
Pittsburgh, Pa.  
Portland, Ore.  
Providence, R. I.  
Richmond, Va.  
Rochester, N. Y.

St. Louis, Mo.  
Salt Lake City, Utah  
San Francisco, Cal.  
Schenectady, N. Y.  
Seattle, Wash.  
Spokane, Wash.  
Springfield, Mass.  
Syracuse, N. Y.  
Toledo, Ohio  
Washington, D. C.  
Youngstown, Ohio

\*Southwest General Electric Company  
For Canadian Business refer to Canadian General Electric Company, Ltd., Toronto, Ont.  
General Foreign Sales Offices: Schenectady, N. Y.; 120 Broadway, New York City; 83 Cannon St., London, E. C., England.

# Splicing Sleeves



For a low cost, light weight splicing sleeve of exceptional strength, the R2 cannot be excelled.

LARGE corrugated wedges of forged steel hold the wire in a tight grip.

CLINCH ends transfer the trolley wheel from the wire to the sleeve without pounding or arcing.

THE trolley clearance on the under run is good.

## General Electric Company

Atlanta, Ga.  
Baltimore, Md.  
Birmingham, Ala.  
Boston, Mass.  
Buffalo, N. Y.  
Butte, Mont.  
Charleston, W. Va.  
Charlotte, N. C.  
Chattanooga, Tenn.  
Chicago, Ill.  
Cincinnati, Ohio  
Cleveland, Ohio

Columbus, Ohio  
\*Dallas, Tex.  
Dayton, Ohio  
Denver, Colo.  
†Detroit, Mich.  
Des Moines, Iowa  
Duluth, Minn.  
Elmira, N. Y.  
Erie, Pa.  
\*El Paso, Tex.  
Fort Wayne, Ind.  
Hartford, Conn.

General Office: Schenectady, N. Y.

ADDRESS NEAREST CITY

\*Houston, Tex.  
Indianapolis, Ind.  
Jacksonville, Fla.  
Joplin, Mo.  
Kansas City, Mo.  
Knoxville, Tenn.



Los Angeles, Cal.  
Louisville, Ky.  
Memphis, Tenn.  
Milwaukee, Wis.  
Minneapolis, Minn.  
Nashville, Tenn.

New Haven, Conn.  
New Orleans, La.  
New York, N. Y.  
Niagara Falls, N. Y.  
\*Oklahoma City, Okla.  
Omaha, Neb.  
Philadelphia, Pa.  
Pittsburgh, Pa.  
Portland, Ore.  
Providence, R. I.  
Richmond, Va.  
Rochester, N. Y.

St. Louis, Mo.  
Salt Lake City, Utah  
San Francisco, Cal.  
Schenectady, N. Y.  
Seattle, Wash.  
Spokane, Wash.  
Springfield, Mass.  
Syracuse, N. Y.  
Toledo, Ohio  
Washington, D. C.  
Youngstown, Ohio

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General Foreign Sales Offices, Schenectady, N. Y.; 120 Broadway, New York City; 83 Cannon St., London, E. C., England.

7571

# Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 51

New York, Saturday, April 20, 1918

Number 16

## What Is a "Reasonable Rate of Return," Now?

TO SPEAK of the rate of return—because we are all speaking of it these days when much financing is being done on a 7 per cent basis—it is interesting to read the following in an official notice from the acting commissioner of internal revenue in regard to the return for special excise taxes on companies organized in the United States: "It has been found upon examination of returns of net income of a large number of different classes of corporations listed on an exchange that they earn approximately the following rates in order to make their stock worth par." Then follows the rates for various kinds of business, including 8 per cent for public utilities.

In Doolittle's book on "Cost of Urban Transportation Service, the average showing of 975 companies in 1912 was given as 4.90 per cent on interest-bearing debt and 2.64 per cent on capital stock. The showing made by sundry manufacturing concerns was also quoted, the percentage of profit to investment ranging in several cases to more than 40 per cent.

A recent report on Boston conditions says: "Nothing better illustrates the difference existing between various types of big business, perhaps, than the fact that a threatened possibility of limiting some of the big industries to 'cost plus 10 per cent profit' sends the stock market tumbling down, while a like profit to a traction company would probably start an investigation looking toward a reduction in fares."

For some reason the public has the idea that utilities are not bound by the inexorable laws of trade. That is foolish. Utilities must have a rate of return sufficient to attract new capital. The safer such a return is, the lower it should be. But the people want a low return without safety. Such a policy means disaster, and commissions ought so to aver.

## Has Municipal Ownership Lost Its Charm?

WITH federal control of the steam railroads, one would think that the time would be propitious for the municipal ownership advocate again to demand that the municipalities take over the local trolley lines. Actually, there seems to be comparatively little talk of this kind outside of New York State, where there has been a rather feeble effort to get the subject into politics. Of course, the request of the federal government that the municipalities should keep down to the minimum their construction projects and the high rate of interest which the municipalities have to pay now on any new securities issued probably have had a great deal to do with this abatement of interest. But we believe a more effective factor has been the better understanding that local trolley systems are not money makers.

When the electric railways were considered financially profitable there was a great cry that the city ought to own them. Now that conditions are such that they are paying only a very low rate of return upon their investment, the glamor about them seems to have passed away. Nevertheless, they are the same properties that they were before, consisting of the same rails,

cars, wires, power stations, etc., as when coveted by the M. O. advocates.

Most electric railways owners, we believe, would be much pleased to get out whole from their properties and sell them to the city for the money actually invested in these properties. As a matter of self-interest, they could very properly agitate for city purchase. But the experience of the last few years has shown that an electric railway is a hazardous undertaking financially, and raises the question whether a city has any right to invest large sums from the municipal treasury in an enterprise which may not be a financial success.

## Of Course Business Men Approve

The Chamber of Commerce of the United States is composed of men with a keen sense of practical values. They know how to listen to facts and give prompt decisions in accordance therewith. The business men of the country were running true to form when last week in Chicago they adopted the following resolution:

*"The Chamber of Commerce of the United States recommends to state and local authorities that they recognize the unusual and onerous conditions with which public utilities are contending, and that in the interest of the nation, of business and of the public they give prompt and sympathetic hearing to the petitions of such utilities for assistance and relief."*

We are glad that another ally has joined the forces of those fighting for utility preservation. Most of the commissions are courageously trying to do their duty, but the public must be made to feel more deeply the nation's need for utility maintenance and extension.

## Free the Nickel Fare from Non-Transportation Charges

**I**F A STREET RAILWAY is required to pay a sum greater than is actually required to repair the pavements that have actually been deteriorated by its presence, the real result is that the car riders are paying a tax which should be borne by the community."

In these words, the Street Railway Investigation Commission of Massachusetts in its recent report on electric railway problems calls attention to a factor which has an important bearing on the cost of transportation. The commission goes so far as to recommend the passage of an act requiring these companies to maintain in good repair, but not to renew or replace, the paving between the rails and tracks and, in the case of streets otherwise unpaved, for 18-in. outside the rails. The commission also recommended that if an alteration is made in the location of tracks in highways, no portion of the expense of such changes shall be borne by the company, except when the alteration is made upon petition of the company.

With the renewal of franchises in various cities and a growing demand for the adoption of the partnership principle in such contracts, the importance of freeing the nickel fare from such charges is appreciated more and more. The same applies to other public burdens, such as cleaning the right-of-way and restoring tracks which have been disturbed for the construction of sewers and other underground improvements being installed by the city. That these items are not inconsiderable may be judged from a statement made by one of the larger companies some time ago, showing that the expenditure, made by it for non-transportation charges during eight years, represented a charge for interest and operating expense of more than \$600,000 per year.

The property of an electric railway company, when laid in the street, is entitled to the same protection as any other property. If some other utility is being constructed in the street, and during this work it is necessary to destroy a part of the property of the electric railway, the value of the property so destroyed should be considered as a part of the cost of such other utility and the railway company reimbursed to the full amount of its damage and expense. The patron who pays a nickel for a car ride is entitled to a nickel's worth of transportation, and in large cities where the cost of rendering the service is constantly increasing, it will be necessary when the contract relations of the city and the company are being readjusted to provide that the entire fare shall, if necessary, be used for transportation purposes.

The special Massachusetts commission asks whether it is fair to require the person who rides in the street car to pay some of the taxes which should be paid by the automobile rider. It points out that local authorities can reduce the tax rate in their municipality by this expedient, and that there is little doubt but that it has been done to some extent in the past. The same point was made in the Bay State fare case, where the commission declared that any burden imposed on the company must ultimately be paid by the people. The Oregon commission in the Portland Railway case evidently had the same views when it said: "The question then arises as to whether this paving should be installed and maintained by the car rider when, as such, he de-

rives no benefit therefrom, or whether the burden should be borne by the abutting property owner who enjoys not only the benefit of the paving, but any advantage which may accrue from the proximity of the car service."

If the people of a community want to keep down the rate of fare they should see to it that non-transportation charges are carried by those who benefit most from them.

## "Bunghole Economy" and the Electric Railways

**T**HE big idea, which the general movement for increased revenues for the street railways has driven home, is "value of service." Getting to work means more in war times than it used to mean in peace times. It means more to the government in results of the work; it means more to the workmen in wages.

In the earliest days of the movement for 6-cent fares, the objectors' sole thought seemed to be to avoid the payment of an added cent of fare. They gave no thought to the idea that unless the railways got the added cent they could not meet their rising costs, that service would have to be cut down. It seemed to be taken for granted that the cars would keep on running, and that the only difference would be that the "swollen profits" of railway magnates would be reduced. It was a general attitude of "we should worry."

But the public's eyes are opening to the fact that the real thing at stake is service—not only the old service, but the necessary new service. Countless factories have sprung up in outlying sections of cities everywhere, with a need for new lines.

The parallel between the case of the electric railways and that of the steam railroads is almost exact. Time after time the steam railroads applied to the Interstate Commerce Commission for increased freight rates, pointing out the need of greater revenues to provide more cars, more locomotives, more track and new terminals. Time after time their requests were denied. Even before the war the equipment was suffering depreciation, and when the war actually came the railroads could not meet the huge new demands for service. No one can ever calculate what that unpreparedness has cost the community. The savings to the shippers on freight bills are infinitesimal compared to the loss in service now and the direct addition to costs for lack of it.

Let the householder who last winter had to pay from \$9 to \$10 (or more) a ton for coal do a little calculating. Say the average family in the average small house uses 10 tons of coal a year. At \$7 a ton the fuel bill was \$70. At \$10 a ton it was \$100, a difference of \$30. There was more coal mined in 1917 than ever before, but there weren't enough cars, engines, tracks, etc., to handle the total freight, and the increased cost of coal arose principally from that fact.

Apply the same reasoning to all the things thus affected by the transportation trouble—food, furniture and supplies of all sorts. The staggering amount that it has cost the country not to keep the railroads in position to supply service becomes apparent. The millions saved by keeping down freight rates in 1910 and the following years have become billions in losses and



in added prices of materials, due to lack of railroad service.

And so with electric railways. They, too, produce and sell transportation. The cent added to the car fare may cost one constant user of the trolley line \$6 a year. The loss of value on his home on account of reduced trolley service might easily be one hundred times that. If the new factory were delayed a month in opening up each prospective workman in it would quickly be out more than the \$6. Two days' delay in getting to the new job would cost him that and more.

New trolley lines cannot be built to-day to run on 5-cent fares. Cars that cost \$6,000 last year, cost \$10,000 or more to-day, and even at these prices they cannot be had in less than a year to two years. In Tacoma the cost of the municipally owned extension to a new industrial district forced the city recently to raise the fares to 10 cents.

The public is beginning to see that the important point is not the rate of fare—it is the service. When your child is ill you do not haggle over the cost of the doctor's services. You pay his bill. And, if it actually came to the question of having some doctor's services or not having any—you'd pay twice anything you had.

But there are many doctors. The services of other electric railway systems cannot be commanded by telephone.

These are the reasons back of the call of Secretary McAdoo, reinforced by the letter from President Wilson, to local authorities everywhere to treat the electric railway needs with an eye upon the service result. The government's experience with the railroads has taught most convincingly the lesson that it is the most flagrant uneconomy to pour cider out of the bung hole to save buying a spigot. That form of government economy has been scrapped. The case is no different with the electric railways, and the public is learning it.

### Schools Should Utilize Educational Opportunities Afforded by Conventions

**G**REAT inventors are continually producing machinery and equipment of recognized value. Science is adding methods for manufacture and production that decrease the amount and expense of the labor necessary to turn out and maintain the equipment. The real benefits which can be derived from conventions may have escaped the ordinary citizens but they have not escaped the men responsible for railway operation and equipment manufacture. There is never a time during a convention that the special exhibits and new equipment are not crowded with attentive, thinking, inquiring railwaymen, and the sales of new equipment prove that these men go to conventions to learn of the latest and most efficient devices for getting the maximum output from their cars and the equipment necessary to operate and maintain them and they buy to improve their equipment.

It is the custom of our various institutions of learning to organize inspection trips for their students to visit large manufacturing plants, power stations and railway systems as a means of educating them in the duties they will be called upon to perform in the profession they have chosen. Why not make more use of our industrial exhibitions? There is no place where more desirable information and education can be obtained readily.

Not only are the exhibits a great source of knowledge, but the technical papers presented and discussed present an exceptional educational opportunity.

### What the Electric Railway Figures for the Year Show

**R**EPORTS on the business of individual electric railways in various parts of the country are given each week in this paper, and other general statistics are presented from time to time. It was interesting, therefore, in the light of current financial and economic developments, to have an opportunity to study the more comprehensive figures for the year 1917 gathered by the information bureau of the American Electric Railway Association and published in detail in the issue of March 30. They represent for most of the data the returns from 8437 miles of line, or about one-fourth of the total mileage in the United States. For this reason they may be taken as fairly indicative of general conditions.

The story of rising costs of materials, supplies and labor is best told in the increased operating ratio. Even this does not present the full significance of the facts because it gives no credit for the efficient management which in many instances kept that percentage from mounting still higher. It is not surprising to learn that the largest increases occurred in the expenditures for coal and labor. The experience of the past winter will not soon be forgotten, and while the termination of the war probably will bring an appreciable relief on these two important items of cost the railway executive must take to heart the lessons of conservation which he has had opportunity to learn.

This annual summary of figures would be more encouraging if the increase in gross revenue meant a corresponding gain in net. There is no satisfaction to a management to know that it hauled more passengers during the year if that amount of business did not mean a gain in net earnings. When the contrary is true, one may not be blamed for asking "What's the use?" However, an indication of the tendency toward higher rates of fare is to be seen in the slightly increased average fare per revenue passenger. This may be taken as the most encouraging basis for a reply to the one who is inclined to ask whether the game is worth while.

Another indication of the tendency of the times is shown in the fact that the revenue car-hours increased to a greater extent than the revenue car-miles. On its face this would suggest lower speed, but it may result from the growing practice of having the car-hours represent not only running time but lay-over time and bonus time paid to employees in certain cities. At any rate it is the plainest evidence that transportation is costing the companies more than heretofore.

The information bureau of the association is carrying on an important work in gathering and publishing these figures monthly. It is to be regretted that more companies do not contribute information to this service. It represents the best kind of publicity data because these figures show in cumulative form a picture of the status of the electric railway industry which must impress the authorities to whom appeals for relief are constantly being made. The more complete the information published, the stronger will be this silent argument for corrective measures.

# What the Way Department Finds It Must Do in the Spring

**In Addition to Ordinary Wear and Tear the Track Needs Careful Maintenance, Especially in Drainage, to Repair the Ravages of Winter**

**S**PRING is the season of the year when the way engineer, like the good housekeeper, begins to put his house in order. During the winter he has been busy fighting snow and the effects of frost, and making plans for the next season's work. Before the season has advanced far enough to permit the beginning of the big jobs, such as reconstructing, rerailing and general overhauling, which are in contemplation there is a large amount of work which must be done to overcome the ravages of winter.

Open tracks in private right-of-way suffer most from the action of the elements in winter. Drains and ditches become clogged; tracks heave from frost, and shims or "frost blocks" have to be put in during cold weather to keep the rails in fair surface because it is almost impossible to resurface the tracks by tamping when the roadbed and ballast are frozen.

The extreme cold of winter also has its effect on tracks in paved streets, particularly in older tracks where the pavement may be of a kind having poor waterproofing qualities and in places where the surface drainage of the street in general and the subsoil conditions are poor. If track drains are not present in these places the tracks suffer greatly for this reason. There is no one item which has so great an effect on track maintenance as drainage or the lack of it.

## Last Winter's Intense Cold Caused Unusual Joint Breakage

The winter just past has been one of the utmost severity, and it has left its mark on the track structure. The rails, especially those of tram girder and groove type perhaps fifteen to twenty years old, have suffered an unprecedented amount of breakage, mostly in the vicinity of joints. It is a quite well-known fact that intense cold has a tendency to render steel brittle and when a period of several months is encountered during which the temperature hangs around zero for weeks, at a time, the rail steel is bound to suffer. The joint which has dropped most slightly has the effect of the drop greatly magnified, and the frozen ballast acts as an anvil upon which the cars pound the rails with direful results to the latter.

A long, very cold winter also prevents keeping up with joint maintenance to the reasonable degree which is possibly in an ordinary winter. As a result there is an extraordinary accumulation of defective rails and joints which the way department must try to overcome

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before the heavy business season arrives. This spring the situation is all the more serious because of the lack of men to put on in extra numbers in the attempt to get even with the game.

In open track, tie renewals impose the first and most important work upon the maintenance of way department. Commencing late in March or early in April, or as soon as frost has disappeared, the section gangs are usually increased in size and tie replacement begins. The work is ordinarily carried out upon a predetermined plan which has been made up by the roadmaster or supervisor, following an inspection during which ties needing renewal are marked by spots of paint.

In connection with the renewal inspections it will be found best to have them made by a regular tie inspector

rather than to leave the question open to the judgment of the section foremen. The latter have a tendency to put in all the ties that are available regardless of the fact that some ties in the track may have a year or two of life still left in them. The matter is one requiring experience and judgment because, while ties should not be removed if still fit for some service, yet it is just as important not to permit badly decayed ties to remain in the track.

Poor ties impose additional loading upon the good ties, causing more rapid deterioration of the latter. In determining what ties need replacement, it is worth while to use a standard inspection pick, and such items as the condition of the tie with regard to decay, wear, splitting, traffic, position in the track, kind of timber, condition of adjacent ties, etc., must be considered.

There has always been some question among track engineers as to which of the following methods of renewing ties is the better: (1) Single renewals ("spotting in"), or (2) renewals in continuous stretches ("out of face"). The relative values of the two methods have been considered to be as follows:\*

The advantages of single tie removals may be stated thus:

1. There are always several sound new ties under each rail, making a stronger and safer track.
2. A longer average life of tie is obtained, resulting in less waste of material.
3. Uniformity, year by year, of maintenance charges.
4. A better maintenance organization because the labor force is more nearly constant.
5. Tracks can be kept to more uniform gage.

The disadvantages of single tie renewals are:

1. A continual disturbance of track with resultant irregularities of surface, the disadvantage being much greater where other fixtures, such as paved street crossings, interlocking plants, etc., must be disturbed.



How the track and roadway seem to look after a harsh winter

\*From Willard's "Maintenance of Way and Structures," page 75.

2. A probable higher renewal cost per tie.
3. The requirement of a large amount of time of the section forces each spring in making tie renewals at a time when the track badly needs general attention.
4. Right of way is littered each year with new and old ties.

The following advantages may be claimed for renewals in continuous stretches:

1. Labor cost is less and at the time of renewing ties ballast can be cleaned by using forks and screens.
2. Roadbed is disturbed less frequently resulting in a more uniform support to the traffic.

The disadvantages of renewals in continuous stretches are:

1. The first year or two track is in better condition than by making single renewals. But from the time the renewals are made the condition of the track steadily deteriorates until the time comes, which is just before renewal should again be made, when the track contains no sound ties and is unsafe.
2. Because of the inequality of the life of the ties, even of the same wood, many ties which would last one, two or three years longer would be taken out and wasted. Therefore the average life of ties would be shortened.
3. Track eventually develops irregularities of gage which it is difficult to renew without placing a few new ties under each rail.

It has been found that the single-renewal method is the best for ordinary track conditions and this method is the one most used by the railroads throughout the country. Of course this does not prevent renewing adjacent ties when warranted, and generally it is good practice to renew both joint ties even if one is in somewhat better condition than the other. There are always times when it is best to renew ties "out of face" in such points as at highway crossings, station platforms, interlocking plants, special work, and narrow cuts and other restricted places. The "out-of-face" method also applies to those tracks which are in improved streets because the cost of single renewals would be exorbitant with pavement costs added, even if it were possible to determine just what particular ties needed renewal without opening the pavement.

When it is remembered that from 85 to 90 per cent of all ties purchased are used for renewals and that for open tracks tie renewals constitute the largest item of maintenance cost except labor, it is evident that the subject of tie renewals is one which will bear careful study. In the past there has been much waste in connection with the use of timber, and altogether too little attention has been paid to the matter of ties and timber from an economic viewpoint. Now conservation is being forced upon us by the increasing cost of labor and material. Tie lumber has increased from 30 to 50 per cent in cost within a year and the quality of the timber has not been maintained. A lower grade is being offered and accepted.

In 1915 electric railways spent about \$4,500,000 for ties. If in 1918 they could find the means to make renewals on the customary annual consumption of about

8,000,000 ties their expenditure for tie timber would be about \$6,000,000. The average labor cost of removing an old tie, placing a new one and tamping the ballast around it was 23 cents in 1915 in steam road work. This did not include distribution to the job or disposal of the old ties. It probably costs at least 35 cents now do this work which previously cost 23 cents. Hence if 8,000,000 ties were to be placed this year the cost in place including the ties would be at least \$8,800,000.

No substitute for the wooden tie for use in open track has yet proved equivalent to it; hence for some time to come the wooden tie will hold its place. In view of this and because of the rapidly increasing expense connected with its use, all possible means must be adopted to make the available timber go as far as possible. Much can be done by the use of proper specifications for ties and by careful inspection at the source of supply. The use of treated ties should be increased and careful study should be made to determine the kind of timber most suited to the soil and ballast conditions obtaining. The use of tie plates will often help in rendering timber suitable for longer service.

### Why Winter Weather Causes So Much Joint Trouble in Worn Rail

The most urgent spring work on tracks in paved streets is that of joint repairs. Not only is it the most important but it is also the factor which causes the largest single item of expense for maintenance of track in streets, particularly if the rails be of the old tram girder type and have an average age of from fifteen to eighteen years. When they have reached this age the head wear has usually reduced the thickness of the head to such a degree that the resistance to

shocks and distortions is greatly diminished. In consequence the rate of breakage of rails at joints increases and the difficulty in making repairs becomes more pronounced. There is trouble in finding equally worn rails to cut into the track, and more grinding and welding is necessary in leveling the heads. Sometimes a stock of second-hand rails suitable for repair work is not available and in such cases it is customary to select some sections of the lines, generally in outlying regions for relaying



AN AGGRAVATED CASE OF DRAINAGE INSUFFICIENCY

with new rail, thus releasing the old rail for repair use elsewhere. This is an expedient with which every track man is quite familiar.

In the spring the value of drainage is demonstrated. On open tracks the ditches and waterways must be cleaned of the accumulation of the winter's dirt and rubbish. Similar conditions around the mouths of culverts require attention. This work should be done just as soon as the snow has disappeared and will need the attention of section gangs for several weeks as a

rule. After the first cleaning, these points should receive attention from time to time during the year, and in the late fall they should be thoroughly cleaned and put in order for the winter. There is no question but that clean, well-kept, deep ditches and waterways are of great assistance in lessening trouble from heaving of tracks in the winter season.

Ditches for draining the ballast are better than none but they are not enough greatly to help in maintaining good surface. Ditches should be deep enough to drain the sub-grade and from 2 to 3 ft. below the bottom on the tie, depending somewhat upon the character of the soil. A general manager once asked a roadmaster what was the most important element in good track. The answer was "Drainage." The manager then asked for the second element and received the laconic reply. "More drainage." Asked for the third factor the roadmaster reiterated, "Still more drainage." This was to emphasize the fact that without good drainage, no matter what kind of rail and ballast might be used, the track would be rough and puddled through the working up of mud through the ballast in wet track.

### **Preliminary Surfacing and Gaging Are Seasonable Spring Jobs**

Another early spring job for the section gang on open track is that of surfacing after shims and frost blocks have been removed. While surfacing work is continued throughout the year, it is most necessary in the spring in order to overcome the effect of frost. Consequently, as soon as frost has disappeared the track must be gone over and given a fair running surface. This is done by tamping up the low spots to bring the track to an easy riding surface, without much attention to general surface. The work of general surfacing is more often done later in the season following rerailling or reballasting.

Gaging of track is still another job which must be attended to in the spring. Tracks are apt to get out of gage during the winter season as a result of poor surface conditions. The trouble is aggravated if the percentage of first-class ties in the track is somewhat low, since the ability of spikes to hold the rail to gage depends upon the strength of the tie timber. Rails also need gaging, occasionally to take up side wear. It is, therefore, essential that tracks be regaged after a winter season, and all variations from the standard gage should be corrected. The usual maximum tolerances in gage are  $\frac{1}{2}$  in. wide and  $\frac{1}{8}$  in. narrow. Variations over these tolerances should be removed.

### **What May Happen With Poor Drainage**

The importance of drainage for all kinds of tracks can be emphasized in no better way than by calling attention to the accompanying view of a situation created by the lack of it. Here the tracks run through outlying territory and in an old private way. The land has been filled in on either side of the railroad to a height of 7 ft. or 8 ft. above the track level. In an ordinary winter no great trouble was experienced from lack of proper drainage as the water rose only a few inches above the rail and then seeped away rapidly after the storms ceased. The past winter, however, was so severe and the frost went in so deep that the

water could not get away fast enough to prevent trouble. The operating department of the railroad resorted to the scheme of mounting motors on a car above the floor so as to permit running it through the high water. It is now planned to install drains which will obviate further difficulty from this source.

### **Winter Frost Plays Hob With Paving**

The repair of pavement is a line of work which comes up in the spring. The winter season is particularly hard on track pavements, partly because of frost action, and partly because vehicular traffic is often confined to the track area for very long periods. This concentrates the wear and adds to the maintenance work which must be done. It is the practice on some roads to send out inspectors to cover the lines early in the spring and make up reports from which it is possible to construct a program of pavement repair work. As a rule the work itself is confined to replacing patches here and there and the best results in doing the work can only be obtained by putting out special gangs to work over carefully-prepared routes. Knowing the routes in advance and the amount of work to be done on each line or street, the materials clerk can arrange the most economical delivery of materials.

### **Testing a Line to See if It Is Alive**

BY G. H. MCKELWAY

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WHEN two power stations or substations feed into the same section of a heavy line, and the circuit breakers through which this line is fed at one of the station opens, it is desirable immediately to know whether or not the other station is still feeding into the line or whether its breaker also has come out.

The scheme generally employed to determine whether or not the line is still alive is to hang a cluster of lamps on the lower stud of the feeder switch, that stud being connected to the outgoing cable even when the switch is pulled. If the lamps light up it is evident that the line is alive from the other station.

At some stations the cluster is permanently connected to ground, so that all that the operator has to do when the breaker "blows" is to pick up a long flexible lead, left hanging about the center of the switchboard, and touch the desired switch blade or stud with a terminal on the end of the wire.

Even when a permanently connected cluster is used as a detector some time is lost in this operation. To save this time in one new station, each panel has been arranged with a pilot lamp of the small bull's-eye pattern connected in series with a resistor between the cable and ground. A snap switch is inserted in the circuit so that it is possible at any time to cut out the lamp and to test the cable for grounds in the ordinary manner with a voltmeter.

Ordinarily the snap switch is left closed and the lamp burns continuously as long as the line is alive. If the circuit breaker should open, the operator does not need to waste even the usual few seconds in testing with the cluster, as a glance at the pilot lamp will tell him immediately whether or not it is lighted and, thereupon, the condition of the line to which it is connected.



# Getting the Right Wood Poles for Electric Railway Service

**Cedar Heads the List—Chestnut Blight a Factor—Characteristics of Available Woods Are Analyzed and Specifications for Pole Purchase Are Given**

LOW FIRST cost, above all other considerations leads to, and will continue for some time to result in the use of wood poles as the chief support of most of the light and medium heavy power lines, irrespective of whether or not this is true in the long run. In addition to being relatively cheap, wood poles are easy to handle; they are reasonably available (there are few sections of the country which cannot furnish some sort of local pole); they are easily climbed, and in soft ground they can be successfully used with special but relatively inexpensive construction where steel or concrete structures would require very costly foundations.

## Poles Last About Twelve Years on the Average

As against these advantages, wood poles are comparatively short-lived. This is due to decay (which accounts for about 95 per cent of the replacements) insect attack, fire, lightning stroke, woodpecker injuries, and sleet and wind storms.

In the years 1907 to 1911 inclusive, the Department of Agriculture recorded the purchase of some 17,560,000 poles. If we assume that 10 per cent of these were used on new construction, and this is more likely an over-estimate than the contrary, the average annual replacement was about 3,512,000 poles. This on a basis of 40,000,000 poles in use, a generally accepted figure, would mean an average life of twelve years. Such a life checks closely with some figures gathered by the National Electric Light Association. If we multiply the average life of each kind by the ratio of that kind to the total in 1915 we get the data given in Table I.

TABLE I—LIFE OF TRANSMISSION LINE POLES			
Kind of Pole	(a)	(b)	Product of (a) and (b) Years
	Average Life, Years, N. E. L. A. Data	Dept. of Agriculture, per Cent of Total	
Cedar	13.5	63.9	8.6
Chestnut	12.0	17.5	2.1
Cypress	9.0	2.3	.2
Pine	6.5	6.0	.4
Oak, etc.	say 8.5	10.3	.9
	"Weighted" Average Life.....		12.2

The above table, however, does not tell the whole story, for the labor of replacing a pole is considerably greater than that of originally setting it, and the disturbance of the attachments not only costs money, but shortens the life of the attachments themselves. Altogether the annual bill for wood-pole replacements is a serious matter. Part of the outlay is unavoidable, but a considerable part is unnecessary and should, therefore, be prevented.

There are many species of tree which are sufficiently upright and straight in their habits to permit their use for poles, but most of these give short service life, lack strength, or are scarce so that there are but few which

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are extensively employed for this purpose. The Department of Agriculture records purchases of 4,077,964 poles of all kinds, for the year 1915; nearly a third of these, however, (1,236,694) were under 20 ft. in length. Telegraph and telephone companies took 44 per cent of the total, electric railway and power companies 35 per cent and steam railroads the remaining 21 per cent. The government records, covering the years 1907-1911 inclusive, and 1915, show the relative demands for several leading species of timber as given in Table II.

TABLE II—RELATIVE USE OF SEVERAL POLE WOODS		
Kind of Wood	Consumption in 1915, per Cent	Consumption Average, 1901—1911 and 1915, per Cent
Northern white cedar.....	42.8	
Western red cedar.....	13.9	
Red cedar.....	2.9	
Southern white cedar or juniper.....	2.2	
All cedars.....	61.8	63.9
Chestnut.....	15.9	17.5
Pine.....	13.4	6.0
White oak.....	4.4	
Red oak.....	0.5	
All oaks.....	4.9	5.2
Cypress.....	1.6	2.3
Redwood, spruce, tamarack osage, orange, etc.....	2.4	5.1

Cedar, which furnishes about two-thirds of the poles used, is long-lived in service, strong, light, straight and of a nature which permits easy and safe climbing by means of spurs. Further, the wide distribution of the several varieties makes it available almost everywhere without prohibitive transportation charges.

Of the four varieties chiefly used, the northern white cedar or arbor vitae is by far the most important, furnishing in 1915 two-thirds of all cedar poles, or 43 per cent of all poles. This was nearly three times as many as were furnished by the next most important wood, chestnut.

## Winter-Cut Poles Are Best

Cedar is a common swamp tree in the Lake and the Northeastern States and in Canada, the bulk of the supply, however, coming from the Lake States. Like practically all timber it should be cut when the sap is not flowing as the sapwood contains the least amount of food for the fungi and other causes of decay. Further, unless the seasoning is done very slowly, the rapid evaporation of the large amount of water present if the sap is flowing is likely to cause serious checking.

It is accordingly quite customary to specify "winter cut" poles, but in very few cases is any effort made to determine whether or not the specifications have been complied with. It so happens, however, that winter is the most convenient time for cutting poles, hence the majority of poles, fortunately, meet the specification. Distinguishing "winter cut" wood from "summer cut" is in most cases, if not always, much like distinguishing "bled" yellow pine from "unbled"; unless the facts are known it is practically impossible to do it.



Western red cedar, known also as red cedar, Western cedar, or Idaho cedar, ranked third in importance in 1915, 13.9 per cent of the poles used being of this species. It is being cut chiefly in the region of the lower Columbia River, of Puget Sound and of northern Idaho. It, however, is much more widely distributed than this. Poles from the Columbia are said to be much freer from butt rot and to weigh more than those from the other localities; otherwise there is said to be little difference.

Western cedar is a very straight-growing tree and furnishes poles of particularly fine appearance. Its chief shortcoming is that it tapers but slightly, hence to secure the necessary butt diameter for heavy service, poles much longer than would otherwise be needed must be cut. In spite of the freight charges, Western cedar has been able in the past to compete to a small extent with chestnut even in the territory of the latter. With the serious reduction of the supply of chestnut as a result of the spread of the blight, its more extended use in the East is almost certain.

Red cedar, which furnished 2.88 per cent of the 1915 supply, occurs throughout the East. In the Northern States the trees are usually too short and too crooked for use as poles, but in the South they grow tall and straight. The heartwood lasts for a long time in the ground, but the sapwood decays very rapidly, giving the untreated pole a comparatively short life.

Southern white cedar, better known as juniper, furnished 2.19 per cent of the 1915 cut. Like red cedar its use is largely local, due, however, not to other demands for the wood, but to the fact that it is one of the less desirable poles, having a fiber strength in pounds per square inch of 3300, against 3600 for Northern white cedar, 4200 for red cedar and 5100 for Western red cedar. Moreover, its life, untreated, is but eight and one-half years against thirteen and one-half years for the others.

### **Chestnut Is Hard Hit by the Blight**

Chestnut has heretofore furnished a much larger proportion of the poles than any of the woods except cedar, the percentage in 1915 being 15.98. However, the enormous destruction of the trees of this species by the "blight," or bark disease, the effect of which is now being widely felt, is certain to make it much less important for some time to come.

Growing freely in most of the eastern part of the country, its mechanical strength, long service life, straightness, height and wide distribution have made chestnut a general favorite. It is, however, considerably heavier than the cedars, is not so straight and, if we except juniper, is not so long-lived in service, averaging, untreated, twelve years as against thirteen and one-half years.

In 1905 the chestnut trees were first attacked by a fungus which feeds on the inner bark and the outer growing, or cambium, layer of the wood. In 1908 the loss of ornamental chestnut trees was estimated by the forest service of the Department of Agriculture to be "certainly several million dollars." Since that time the plague has spread until to-day there is comparatively little chestnut left east of the Appalachians and north of Virginia. So far no practicable meth-

od of prevention is known. Fortunately the wood itself is practically unaffected, and on the death of the tree the fungus also dies. It has, therefore, been possible to use much of the larger timber, but the loss of the young wood is now beginning to be seriously felt. Under the most favorable circumstances there will be a considerable period when the available pole material of this wood will be almost nil.

Chestnut grows from individual seed, or from groups of sprouts from live stumps. In the former case it is usually straight throughout, but in the latter the several trunks grow out at an angle of about 60 deg. for a few feet, thus getting clearance, and then rise vertically. In pole stock this bend usually occurs not over 6 ft. from the butt, so that it comes at or below the surface and affects neither the appearance nor strength of the line, although the unset pole may appear hopelessly crooked to one not accustomed to this peculiarity.

### **Pine Poles Require Treating For Long Life**

Pine until recently has made up less than 5 per cent of the total pole supply, due to the fact that although it is one of the strong pole woods, it has the shortest service life of any unless treated. There is also a great demand for it for other purposes. The heartwood is fairly long-lived in the ground, but the sapwood, which is a large portion of most kinds of pine, decays very rapidly.

Of the Southern pines, the long-leaf variety does not take preservative treatment very well. It has been used to some extent for sawed poles, but the well-justified dislike for such poles and the value of the wood for other purposes are steadily reducing the proportion of this species in use for poles. Short-leaf pine has more sapwood, and so takes preservative better, but its value for lumber also cuts down its use for poles, and it is weaker than long-leaf pine. "Loblolly" pine, which is steadily growing in importance, unlike most pole materials, requires treatment all over and not merely at the butt. So treated it has long life and, while the weakest of the three kinds of pine mentioned, its strength is about the same as that of the Northern white cedar.

### **Western Yellow Pine Has Good Qualities as Pole Wood**

Western yellow pine when treated makes a good pole for local use, particularly if hill grown. Such stock is better shaped, finer grained and stronger than that from the valleys. Untreated it lasts barely three years, but it takes preservative readily and in many parts of the Southwest where this pine is common, a butt-treated pole is cheaper than Idaho cedar untreated, due to the high freight charges on the latter. It has substantially the same service value. Its use is steadily increasing, and in 1909 it was estimated that the supply was more than half as much as the combined supply of all the hard woods in the United States. It grows freely and rapidly, with a strength practically that of Western red cedar. In view of these facts it is quite likely to become one of the more important pole woods of the near future. The best stock is found on the Pacific Coast, but the tree grows commercially in more than a third of the United States.

"Lodgepole" pine, untreated, has the family weakness,

but takes preservatives readily. In its own territory, which is the mountain section of the West, it is steadily growing in popularity. Although it is widely distributed its low strength, about 75 per cent that of the Western red cedar, will probably confine its use as at present to a limited territory. Lodgepole is a slow growing tree and one that has been extensively killed by forest fire. Much of the wood so killed, however, is in fine condition for treatment, for it has been thoroughly dried out and as long as the wood remains sound, which is often for many years, it is at least as good as if live cut.

The Department of Agriculture figures show almost exactly three times as many pine poles purchased in 1915 as the annual average for the years 1907 to 1911 inclusive, and although the percentage of each species used is not given, this increase is in all probability due largely if not entirely to the growing employment of treated poles of species less valuable for lumber.

White oak, which furnished 4.36 per cent of the 1915 total and had maintained approximately that position in earlier years, until recently was employed almost entirely in short lengths and on light and comparatively unim-

years. In its home territory cypress makes a very satisfactory pole, but elsewhere it has shown much variation. One case was reported in the Northeast where a line of unusually heavy poles had a life of less than 5 years.

Redwood, used locally on the Pacific Coast, furnished nearly 1 per cent of the total cut of poles in 1907. The reports show wide variations in different years, the number in 1915 being too small to record separately. The poles are strong and durable, and as they are almost always if not invariably sawed from large logs, there is no trouble in securing uniformity of size and taper.

### There Are "Also-Rans" Among Pole Woods

Besides the above-named woods there is an extensive list of "also-ran," a few of which are very good, but too rare for any but very local use. Others are used because they are the cheapest, or the only material available.

A number of these are as follows, the approximate ratios of the maximum use of some of the most impor-



Often a good deal more hand labor is used in the erection of wooden poles than is really economical

portant communication circuits. Its short life, great weight and high cost makes it one of the less desirable pole woods. Although the total number of white oak poles reported in 1915 did not materially differ from those of previous years, there was a very peculiar change-about. The communication companies, which up to that time had used about 90 per cent of the annual cut, leaving about 1 per cent for power, light and railways and about 9 per cent for the steam roads, in that year took but 19½ per cent, while the steam roads took 73 per cent and the electric companies 7½ per cent.

Red oak has all the shortcomings of white oak, and in addition some of its own. Its use is so limited that it hardly deserves mention. It is used almost entirely on light short-pole communication circuits of minor importance. It furnished but 0.53 per cent of the total cut of 1915.

### Cypress Seems Better for Shingles than Poles

Cypress, which produced 1.66 per cent of the 1915 poles, has shown since 1907 a steady falling off, not only in percentage but in actual number of poles cut. It is a slow-growing swamp tree of the South, of peculiar characteristics. The sapwood decays rapidly, but the heartwood has an extremely long life. Many instances are recorded where shingles have been in service for more than 100 years. Greenwich, Conn., Brooklyn, N. Y., and Clifton, Staten Island, N. Y., have reported shingles still in service after 200 years. Brooklyn claims 228 years life for the shingles, and Greenwich, 250

years. In its home territory cypress makes a very satisfactory pole, but elsewhere it has shown much variation. One case was reported in the Northeast where a line of unusually heavy poles had a life of less than 5 years.

Averaged over a number of years, however, the proportion of the woods used is very small and they usually are reported under the charitable mantle of "all others." Throughout the Middle West and the West, particularly, are many miles of "independent" and country party lines which employ of necessity anything to which their wires can be attached, many of the "poles" being living trees. The fact that of the "all other" poles which made up 2.44 per cent of the 1915 total, practically half were under 20 ft. in length, and 39½ per cent more were between 20 and 29 ft., clearly indicates the character of lines on which they were employed.

Practical application of the above information can only be made in the light of local facts. Other things being equal the local pole is obviously the one to use. As against one or more of the superior virtues of longer life, greater strength or better appearance of the foreign pole must be weighed its cost at the hole, including not only the f.o.b. price, but the freight, handling and hauling charges. Sometimes poles can be hauled direct from car to hole, but often they must be stored for a time, in which case there are not only the double handling charges, but yard service and fire and accident insurance, all or part of which can generally be avoided in the case of local poles.

Weight should also be given to the fact that a wood which has a long service life in the locality where grown may show much shorter life elsewhere. This is apparently due to the same fact which makes possible the various inoculations against disease. A light form of the given or a related disease often leaves in the system of both animals and plants a substance which is poison to other "bugs" of the same kind. The local tree, through a mild attack while alive, has stored up that which for some time keeps the local form of decay from the pole; but this is of little or no avail against the different fungi or bacteria of another region. The case of cypress, referred to previously, is apparently of this kind. It should also not be forgotten that a local material, short lived if untreated, may as the result of treatment show better results than a higher grade of foreign timber. Finally it must be remembered that, in replacing a pole, not only is there the direct cost of the work, but the disturbance of the attachments always shortens their service life, and in many cases leads to the immediate replacement of material which, if untouched, would be good for some time longer.

The injuries to which wood pole-stock is subject naturally divide into two classes, those occurring before use as poles and those occurring in service.

### **"Rot" Is the Principal Enemy of Pole Life**

"Rot" is the result of the action of plant life, chiefly fungi, but of bacteria to some extent also, the general effect of the two being the same. Through the action of these parasites the cell structure of the wood is broken down, leaving a mass with little or no strength. The appearance of the rot depends on the kind of wood and the "villain" that produced it. Except in name it is identical with the decay which occurs after a pole has been set, but the term "rot" is generally used for internal breakdown which occurred during the life of the tree.

"Butt rot" is the least serious of these evils, because it is so obvious that its extent can readily be determined. It is common in the cedars and occurs more or less frequently in almost all pole woods, but unless it takes up more than 10 per cent of the butt section, or extends above the ground line when the pole is set, it is of little importance. The action does not continue after the pole has seasoned unless the cavity is open to the air as well as to moisture.

"Heart rot" and "ring rot" are much more serious because of their concealment, although signs are almost invariably present which to the experienced pole man at once tell the story. The majority of the rots require air, moisture, and heat for their development. Their occurrence inside the pole is possible only as some opening admits the two first-named, and inspection will usually reveal the holes, or decayed or loose knots, responsible for the trouble. Tapping will reveal the presence of hidden cavities by the characteristic sound.

### **Bacteria and Fungi Must Be Kept Out of the Poles**

"Shakes" and "checks" are cracks resulting from wind action or from too rapid seasoning. "Ring," or "cup shakes," involving separation on the lines of growth, usually result from the swaying of the tree in the wind

and doubtless indicate a previous weakness in the growth. "Star shakes," "star checks," "checks" and "cracks" are radial splits of greater or less extent and may be the result of wind action, of abuse when the pole was cut, or of too rapid seasoning with consequent irregular shrinkage and cracking.

"Cat faces" are spots which have been stripped of bark at some time, and over which the bark has never entirely grown again, leaving a round spot of dead wood. Sometimes there is but a thin shell of this dead wood and beneath it the wood is perfectly sound. However, like any bark injury which reaches the wood, it is an



CEDAR POLES MAKE A BEAUTIFUL LINE

invitation for fungus to enter which is quite likely to be accepted. The scar is looked upon with a suspicion often well justified by the heart or ring rot which has resulted through it.

Knots are obviously unavoidable in natural sticks, and so long as they are sound no criticism can reasonably be made of their presence except possibly on the ground of appearances. If the knots are discolored or at all loose or decayed it is quite another story, and rejection of the pole is almost invariably the part of wisdom. If rot has not already occurred inside it certainly will unless special measures are taken to prevent it from doing so.

Ant, grub, and worm holes in themselves are usually not important, but, unless they are of very small extent and will be below the groundline when the pole is set, their presence indicates existing or probable trouble in the wood itself. Further they are apt to lead woodpeckers into investigations which if they do not directly

TABLE III—COMPENSATION FOR "HOLLOW HEART" IN POLES

Pole Length	30 ft.	35 ft.	40 ft.	45 ft.	50 ft.	55 ft.	60 ft.	65 ft.
Average diameter of hollow, inches	Circumferences must be increased by these amounts in inches							
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	1	0	0	0	0	0	0	0
4	2	0	0	0	0	0	0	0
5	3	1	1	1	0	0	0	0
6	4	2	2	2	1	1	1	1
7	Reject	4	4	4	2	2	2	2
8	Reject	6	6	6	3	3	3	3
9	Reject	Reject	Reject	Reject	4	4	4	4
10	Reject	Reject	Reject	Reject	5	5	5	5
11	Reject	Reject	Reject	Reject	7	7	7	7
12	Reject	Reject	Reject	Reject	9	9	9	9
13	Reject	Reject	Reject	Reject	Reject	Reject	Reject	Reject

TABLE V—MINIMUM POLE DIMENSIONS, SPECIAL POLES

Length of Pole	Sawed Redwood Dimensions at		Creosoted Yellow Pine Circumference at	
	Top and Ground, Class A, Inches	Top and Ground, Class B, Inches	Top and Ground, Class A, Inches	Top and Ground, Class B, Inches
Feet				
30	7 x 7 11 x 11	6 x 6 10 x 10	22 35	20 32
35	7 x 7 12 x 12	6 x 6 11 x 11	22 38	20 34
40	7 x 7 13 x 13	6 x 6 12 x 12	22 40	20 36
45	7 x 7 14 x 14	6 x 6 13 x 13	22 42½	20 38
50	7 x 7 15½ x 15½	6 x 6 14 x 14	22 44½	20 40
55			22 47	20 42½
60			22 49	20 44½
65			22 51	20 47
70			22 53	20 49
75			22 55	20 51
80			22 57	20 53
"Ground" circumference to be taken 6 ft. from butt.				

TABLE IV—MINIMUM POLE DIMENSIONS, NATURAL POLES

Length of Pole	Chestnut		Crook, Inches	Cedar Eastern White		Crook, Inches	Cedar Western Red		Crook, Inches	Juniper	
	Top and Ground, Class A	Top and Ground, Class B		Top and Ground, Class A	Top and Ground, Class B		Top and Ground, Class A	Top and Ground, Class B		Top and Ground, Class A	Top and Ground, Class B
Feet											
30	24 40	22 36	10	24 43	22 38		28 37	25 34	5	24 40	22 37
35	24 43	22 40	11	24 47	22 43	10½	28 40	25 36	6	24 43	22 40
40	24 45	22 43	11	24 50	22 47	12	28 43	25 38	7	24 47	22 44
45	24 48	22 47	11	24 53	22 50	9	28 45	25 40	8	24 50	22 48
50	24 51	22 50	12	24 56	22 53	10	28 47	25 42	8	24 53	22 52
55	22 54	22 53	13	24 59	22 56	11	28 49	25 44	9	24 56	
60	22 57	22 56	14			12	28 52	25 46	10	24 59	
65	22 60	22 59	15				28 54	25 48	11		
70	22 63	22 62									
75	22 66	22 65									
80	22 70	22 69									
85	22 73	22 72									
90	22 76	22 75									
"Ground" circumference shall be taken 6 ft. from butt. "Crook" is maximum distance from pole to string stretched from point 6 ft. from butt to point at top.											

result in weakening the pole, give the rain and the rots an opportunity to enter.

Cypress is subject to a disease which, so far as the writer is aware, attacks no other pole timber, or at least no other important pole timber. It is true, however, that the "incense cedar" of the Pacific Coast is subject to "pin rot," which is somewhat similar. In the cypress a fungus eats holes through the wood of the living tree, which are from a quarter of an inch to an inch wide and often several inches long. The holes are frequently bored in very great numbers, seriously reducing the strength of the wood, although oddly enough it at least does not seem to reduce its resistance to decay. It is commonly believed that the "pecky cypress," as it is called, lasts very much longer than the unaffected wood.

In many specifications the writers have included unwarranted objections to "dead," "fire killed," or "river" poles. There is a more or less widespread prejudice against the use of poles which show any signs of having died on the stump, although exhaustive tests of the woods most subject to such untimely end has shown no appreciable effect on the life so long as the wood is sound. The better specifications of to-day provide for the acceptance of such poles which show sound wood under a thin dead surface.

The extent to which defects may or may not occur in poles for various services is set out in much detail in many specifications, more or less intelligibly. The following summary of these covers the important elements.

Wood poles must be delivered in piles or on cars at specified delivery points, and will be inspected at points of shipment or of delivery as may be agreed. In either case the shipper must give the purchaser every facility for inspection.

Poles of whatever kind of wood must be first quality, reasonably straight, well proportioned from butt to tip, without short crook, reverse curve, or two or more curves or crooks; they must be barked but not shaved, with knots and limbs closely trimmed and butts and tips

squared, and they must be of full dimensions. No allowances will be made for alleged shrinkage said to be due to seasoning or to any other cause.

The poles must be sound, free from butt rot, butt hollows which would impair the strength as poles, large cracks or season checks, large, loose, hollow, unsound, rotten, or plugged knots; ant-eaten, grub-eaten, or worm-eaten wood unless of small extent and below a line 6 ft. above the butt; woodpeckers' holes, cat-faces unless small and sound and not within 6 ft. of the butt or within 10 ft. of the tip; wind-shakes, ring-shakes, or cup-shakes, sap-rot, internal rot or bad tops.

Some Woods Require Individual Specifications

Northern white cedar and Western red cedar, in addition to meeting the above requirements, must have at least three-fourths of the surface free from dead streaks. Dark red or copper-colored surfaces will not be considered cause for rejection if good sound wood lies immediately beneath. No pole will be accepted if it has a twist in excess of one complete twist in 20 ft. of length. Hollow heart in sound butts will be accepted if the circumference at a point 6 ft. above the butt is greater than specifications for sound poles by the amounts given in Table III.

Scattered rot not less than one-fourth of the diameter from the circumference will be figured as equivalent to hollow heart of the same cross-section; cup shakes, star shakes, and heart shakes will be figured as equivalent to hollow heart area as that checked or shaken.

Redwood poles must be sawed from first or second butt-cut logs of sound No. 1 redwood and shall have not over 4 per cent of area in sapwood, nor shall the sapwood be over 1 in. at any point. No transverse cracks will be allowed, and butt hollows, if present, must have sound walls and must not have an area over 10 per cent of the pole section at that point.

Dimensions of Class A and of Class B wood poles must be as given in Tables IV and V.

# Service Conditions Determine Car Equipment Characteristics

By C. W. Squier  
Electrical Engineer

The Writer Shows What Fundamental Traffic Data Are Required Before Making a Choice of Motor Equipment

IN A PREVIOUS article I gave an outline of the data that are desirable to determine service conditions, and some suggestions as to the best methods for obtaining these data. Let us now consider a particular service and make use of these data to determine the motor equipment best suited for the requirements.

## How Number and Duration of Stops Vary with Service

I have chosen for consideration first a city and suburban service and the data I shall use are from actual tests made on a large system operating this service. In making these tests twenty of the most important lines were chosen as being representative of the entire system, and a traffic survey was made of these lines. In tabulating the results for the summarized data record, each line was divided into sections and the data have been tabulated for each section. By this method we have been able to determine accurately the service characteristics of the various districts as well as the requirements for the complete line. A comparison of the results of these tests indicates that this service in most cases is made up of four distinct classes as follows:

1. At the ends of the lines there are runs of from 1½ to 2½ miles in length through a suburban district where the stops average from five to six per mile. These stops are of comparatively short duration due to the small number of persons boarding and alighting at each stop.
2. Another class of service is through a more closely populated residence section with stops of from seven

to nine per mile, with some transfer points and with a correspondingly longer time for stops.

3. The next class is operation through a business section where the stops average from twelve to sixteen per mile and where the headway between cars is so short, due to several lines operating over the same tracks, that there is very little operation beyond the series position of the controller. Frequent slow-downs for traffic also add somewhat to the congestion.

4. The last class of service involves entering and operating across bridges which have severe grades at each end and where the only stops are due to congestion of traffic. The length of these runs is from 1 to 1½ miles in each direction.

In the following "Traffic Data Record" I have shown

this summarized record for four of these lines. This will illustrate how the data were separated for each line so as to show average results for each class of service:

The columns on passenger loads give some very good information as to districts where passengers are picked up and discharged and the average loads carried throughout the various sections of the line. In order to illustrate this more clearly I have plotted graphs

showing the average number of passengers carried in the different zones for the four lines given in the table and have also indicated the seating capacity of the cars operated and the average schedule speed that is maintained.

It should be borne in mind that these represent average and not maximum conditions, and also travel in both directions through the various sections.

A further comparison of the different classes of service is obtained by averaging the results from all lines with the data divided and tabulated as follows:

TRAFFIC DATA RECORD												
Line	Section	From	To	Class of Service	Length of Run, Miles	Per Cent of Total Mileage	Average Schedule Speed M.P.H.	Average Number Stops per Car-Mile	Average Length Actual Stops Seconds	Average Number Passenger on for Day	Maximum Number of Passengers on Car One Time	Maximum Number Passenger Carried Any One Trip
No. 1	A	Ridge—Ralph		2	1.086	16.8	8.23	8.05	9.58	23	62	68
	B	Ralph—Birch		2	3.185	49.7	8.55	8.34	6.60	35	84	127
	C	Birch—Water		3	0.607	9.3	5.40	16.50	7.54	22	63	67
	D	Water—Terminal		4	1.570	24.2	9.90	2.12	8.26	18	66	67
	E	Ridge—Terminal Av.		Av.	6.448	Total	8.25	6.96	7.04	26	66	145
No. 2	A	Depot—Twentieth Avenue		1	1.566	19.0	11.40	3.87	6.72	5	35	36
	B	Twentieth Avenue—Atlantic		2	3.997	48.6	8.90	6.90	7.82	28	98	109
	C	Atlantic—Water		3	1.105	13.1	6.70	11.80	8.94	24	101	116
	D	Water—Terminal		4	1.589	19.3	8.90	2.40	5.68	17	59	59
	E	Depot—Terminal		Av.	8.257	Total	8.90	6.94	7.99	33	101	127
No. 3	A	Sixteenth Avenue—Church		1	0.593	6.1	11.70	5.58	7.89	19	36	49
	B	Church—Reed		2	4.725	48.5	10.70	7.64	6.73	24	54	69
	C	Reed—Plaza		3	2.852	29.3	7.14	11.75	7.07	24	70	86
	D	Plaza—Terminal		4	1.550	16.1	12.36	1.32	6.63	10	34	40
	E	Sixteenth Avenue—Terminal		Av.	9.720	Total	9.45	8.00	7.41	27	55	101
No. 4	A	Prospect—Avenue X		1	12.50	2.01	12.28	4.54	7.15	7	18	20
	B	Avenue X—Plaza		3	3.505	56.2	7.60	13.54	7.31	20	78	108
	C	Plaza—Terminal		4	1.478	23.7	12.55	1.25	4.06	16	63	63
	E	Prospect—Terminal		Av.	6.233	Total	9.46	7.55	7.09	18	78	108



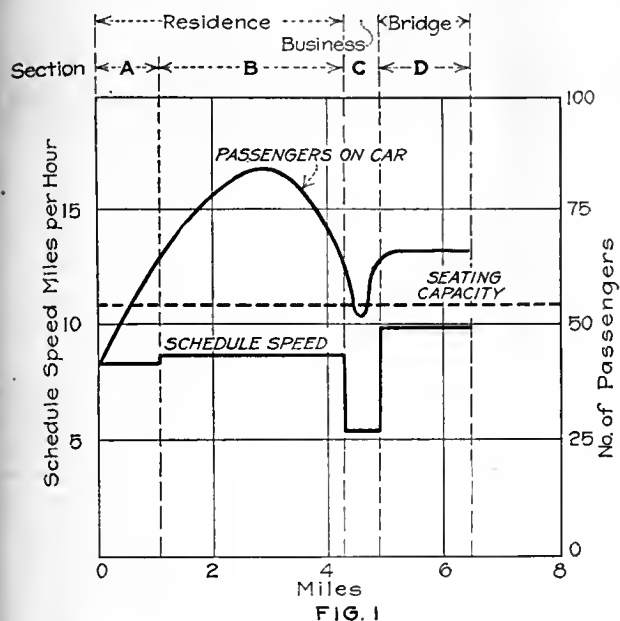


FIG. 1

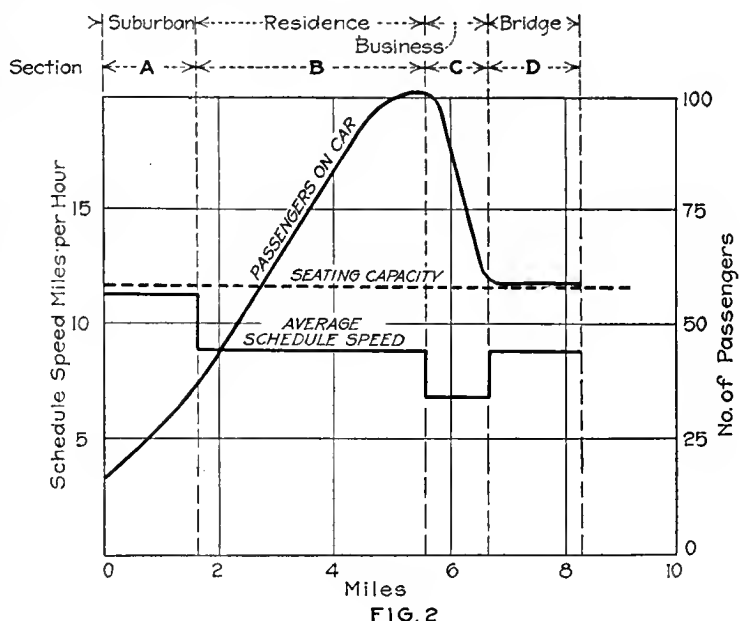


FIG. 2

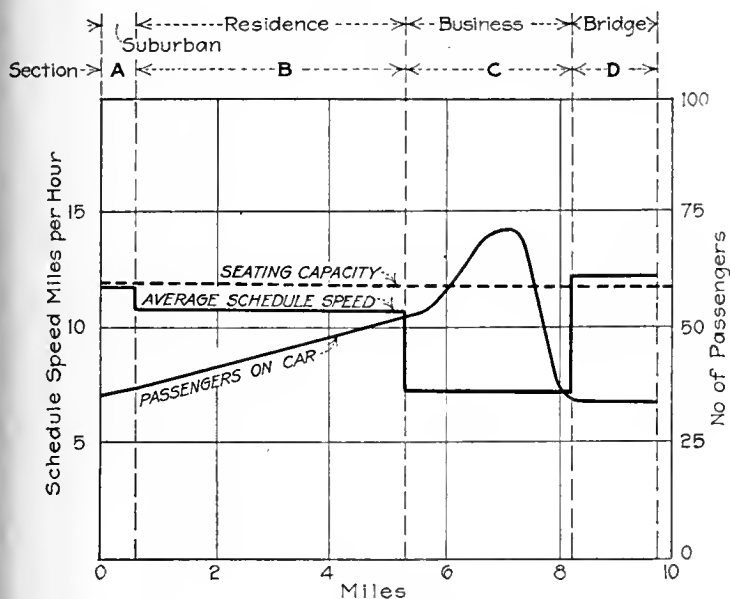


FIG. 3

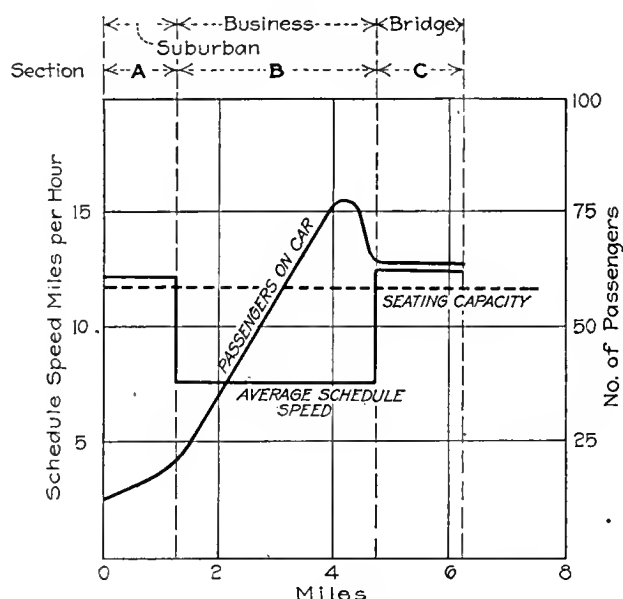


FIG. 4

FIGS. 1 TO 4—GRAPHS SHOWING CAR LOADING IN DIFFERENT ZONES FOR FOUR TYPICAL LINES

to show average requirements for each class of service:

SUMMARY OF SERVICE TESTS				
Class of Service	Per Cent. of Total Mileage	Average Schedule Speed, M.P.H.	Average Number Stops per Car-Mile	Average Duration of Stop, Seconds
Suburban.....	12	11.3	4.4	7.2
Residence.....	38	8.7	8.1	7.2
Business.....	37	7.3	12.4	7.6
Bridges.....	13	10.9	2.7	6.6

In the column showing the percentage of total mileage operated in each class of service it is seen that the mileage for suburban operation is practically the same as for bridge operation, these being 12 per cent and 13 per cent of the total mileage respectively. Also the mileage operated in residence districts is nearly the same as that operated in business districts, these being 38 per cent and 37 per cent respectively of the total mileage, or about three times that operated in suburban and bridge service. The highest schedule speed obtained was 11.3 m.p.h. in suburban service with

an average of 4.4 stops per car-mile of 7.2 seconds each, while the lowest schedule speed through business districts was 7.3 m.p.h. with an average of 12.4 stops per car-mile of 7.6 seconds duration. This average number of stops per car-mile includes slow-downs; it being assumed that two slow-downs are equal to a stop. The average length of stop is very uniform, this varying only from 6.6 to 7.6 seconds.

### Operating Characteristics Show Schedule Speed as Affected by Stops

From these data I have plotted an operating characteristic graph, Fig. 5, showing the variation in schedule speed with the number of stops made per mile. By referring to this figure it is seen that the schedule speed varies from 7.3 m.p.h. with a stop every 425 ft. to 15 m.p.h. with stops every 2600 ft. Such a graph plotted from the service conditions on any road will be found very useful for comparing the different equipments operated. We can now use this curve for the preliminary selection of motors upon which to base our calculations in choosing new equipment.

Our first problem in connection with the choosing of the motor equipment of a car is to lay out a duty cycle from the service requirements, with certain preliminary assumptions as regards weight of the car, desired rates of acceleration and retardation and a decision for our first calculations as to the number of motors per car to be used. I shall later make some comparisons to show the relative advantages possessed by two and four-motor equipments, but for the preliminary study we shall assume two motors per car.

In the preliminary calculations for any proposed equipment, speed-time curves with the current and energy consumption curves form the basis for calculating the performance of the equipment and give the

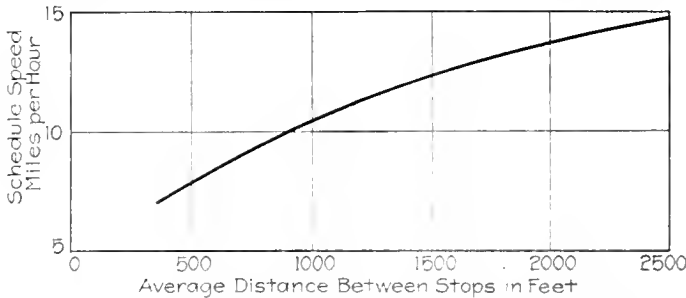


FIG. 5—VARIATION OF SCHEDULE SPEEDS, WITH NUMBER OF STOPS

first start toward making the selection of the motors to be investigated for capacity as limited by heating. There are a number of things to be considered in the selection of a motor for a given service. The most important requirement is that the motor chosen must be capable of performing the required service without becoming overheated. The amount of heating in service is determined by the “square-root-of-the-mean-square” motor current and the average voltage on the motor. In the service which we are considering, a long series of tests has shown the average line voltage at the cars to be 540 volts.

Again the motor should be able to make the desired schedule speed safely and, in addition, it should have some additional capacity and speed for making up lost time. The maximum attainable speed, however, should be kept as low as is consistent with the above condition, and the gear ratio chosen should be such that

when the car is running at its maximum speed, the motor armature speed will not exceed a safe limit.

Motor Capacity Theory and Practice Can Be Brought into Close Agreement

A number of articles have appeared in the *ELECTRIC RAILWAY JOURNAL* from time to time giving methods of calculating the performance of railway motors while operating under service conditions. It is possible, however, that the degree of accuracy with which a service may be predetermined is not very generally understood. By checking preliminary calculations with actual results taken from tests, railway engineers have reached a stage where it is possible to choose the equipment and be certain that it will fulfill the required conditions. So close agreement has been established between theory and practice.

In these preliminary calculations it is usual to simplify the work somewhat by substituting a uniform grade for the irregular profile of the road. This uniform grade is taken as the average of the various grades between terminal points. In the present service I intend to treat the bridge runs where the most severe grades are encountered separately, while the average grade for the remainder of the service is so small that it may be neglected in the first calculations. Curve resistance and the effect of curves on the speed is usually averaged in laying out the typical run except in districts where these occur so frequently and are so severe as to require low-speed running.

Instead of figuring out each individual run for a car or train making frequent stops, the service is studied by typical runs equal in length to the average distance

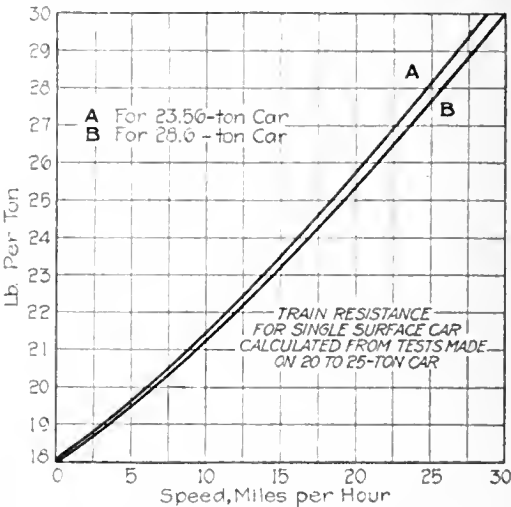


FIG. 6—TRAIN RESISTANCE FOR SURFACE CARS

OPERATION WITH SINGLE CARS	
Weight of car.....	39,000 lb.
Seated load fifty-eight passengers.....	8,120 lb.
Standing load 130 passengers.....	18,200 lb.
Average line voltage from test.....	540 volts
Diameter of driving wheels.....	28 in.
Number of motors per car.....	2
Average length of runs:	
Suburban.....	1,200 ft.
Residence.....	658 ft.
Business.....	427 ft.
Average.....	620 ft.
Bridge runs will be studied in detail	
Average duration of stop:	
Suburban and residence.....	7.2 sec.
Business.....	7.6 sec.
Average.....	7.3 sec.
Schedule speed:	
Suburban.....	11.5 M.P.H.
Residence.....	9 M.P.H.
Business.....	7½ M.P.H.
Bridges.....	12 M.P.H.
Average.....	9 M.P.H.
Accelerating and braking rates.....	1½ M.P.H.P.S.
Train resistance.....	Use curve from actual tests
Curve resistance.....	8 lb. per ton per degree of curvature
Speed in m.p.h. on curves to be limited to the square root of the radius in feet	

DATA FOR DUTY CYCLE AND SPEED TIME CURVES

Speed at crossovers not limited.  
A tractive effort of 100 lb. to be used for accelerating 1 ton at a rate of 1 m.p.h.p.s

between stops for the service under consideration. Some discretion has to be used in applying these methods as they do not hold good over too wide limits, but with precautions they will produce accurate results.

In order to apply this method to the study of the service selected for illustration the data in the accompanying table will be used.

Numerous empirical formulas have been developed for train resistance, some of them based on very elaborate tests. The values obtained by the use of these formulas differ widely. The graphs, Figs. 1 to 4 and 6, shown in accompanying illustrations are derived from

# Testing and Treating Power Plant Feed Water

**Careful Analysis and Judicious Use of Chemicals Are Necessary to Insure Long Life of Boiler and Condenser Tubes—Corrosion, Scaling and Priming Are the Enemies of Satisfactory Boiler Operation as Far as Water Is Concerned—"Concentration" of Boiler Water Needs Watching**

*By Hartley Le H. Smith*

Chief of Bureau of Tests  
Brooklyn Rapid Transit System

IN THIS and succeeding articles we shall deal with the raw materials of the power plant, in this one with water. In line with strictest logic water cannot be called such because kinetic energy in electric form is the one finished product, and potential heat of the fuel (its B.t.u. content), is the one raw material. The very strict logician would even find fault with this statement, reminding us that potential heat, while a very real entity, is not a material substance, raw or otherwise. Such a logician would also tell us that even a hydro-electric plant converts, fundamentally, the *potential energy* of the water into *kinetic energy* in electric form. He would bring out that in both the steam driven plant and the hydro-electric plant, water serves as a material medium for energy transformation, and in both plants all of the water that enters leaves again as water. Even in the steam plant water, manufactured if you like into steam, is in the end reconverted into water.

But putting aside such fine distinctions, and thinking only of the steam plant, let us consider some of the problems with which plant operators are faced due to the numerous and all important ways in which water, by changes of state and of temperature, serves its purposes in the production of kinetic energy in electric form.

## **Impurities in the Water Are Sources of Preventable Trouble**

These problems raised by water handling are chemical problems. In many ways hydraulic engineering problems are real enough in steam-electric plants. They are not entirely problems of the designing engineer either,

*(Concluded from page 750)*

a series of tests which I made on surface cars of from 20 to 25 tons weight operating on city service. Since making these tests I have had occasion several times to check these with the results of other tests in similar service. I find that they compare very closely with results obtained. To adapt these data to calculations where the weight of the cars vary slightly from the ones actually tested, I have worked out the following empirical formula:

$$F = 18 + 0.3V + 0.1 \frac{V^2}{T}$$

when  $F$  = train resistance, pounds per ton

$V$  = speed, miles per hour

$T$  = weight of cars in tons

This formula for train resistance, worked out graphically in Fig. 6, should be used only for single-car operations on surface tracks and for cars corresponding closely in weight to those tested.

although very often if he would give them more attention as technical hydraulic problems the operating man would get a few additional credits in the station thermal-efficiency accounts. But the operating man is faced continuously with some all-important chemical problems due to water. If water were just water these problems would disappear; but all water in the power plant has contained in it other substances in solution or suspension, and they make the trouble. Even hot-well water in the act of condensation absorbs gases. Thus the power plant engineer's chemical problems are ever present.

Power plant water will corrode, it will scale, it will prime. It has to be kept from doing all three things, or so nearly kept from doing them as to make their evil effects of small consequence. There is still room for the better accomplishment of this even in the best operated of present-day power plants.

Water may corrode condenser tubes, ferrules, tube sheets, boiler tubes, boiler drums and internal feed pipes. Condenser circulating water is all too often corrosive, in fact is usually so. It is used in such vast amounts that correction of its corrosive properties is absolutely prohibitive in cost and is never attempted. Sole reliance is placed on selection of metal for the tubes, ferrules, and tube sheets of condensers which will be least affected consistent with reasonable cost. But in connection with the requirement last mentioned it must be remembered that the cost of condenser tube corrosion is all too often entirely unreasonable, so that any costly tube which would stand up would be cheap in the end.

The corrosive properties of the feed water can be controlled; so also can its scale-forming properties and likewise its priming properties. With proper handling of these three the boiler-room-water chemical problems, at least are solved.

## **Water "Concentration" in the Boilers Must Be Kept Down**

Boiler water will not corrode if it is alkaline, but not too alkaline. It will not scale if its sulphates are converted to carbonates. It will not prime if undue concentration of feed water is prevented in the boiler drums. This last point is of very great importance. To hear some power plant engineers talk one would think that they ran their plants on two separate and distinct kinds of water, namely, condenser circulating water and boiler feed water. Instead they actually use three separate and distinct kinds of water; condenser circulating water, boiler feed water and *concentrated water inside the boilers*.

A natural question at this point is: How much does boiler water concentrate? The answer is furnished by noting how much water the boiler-room engineer blows out of the boilers through the blow-offs, or how much

leaks out through leaky blow-off valves in addition to the water which is intentionally blown off. If it amounts to 5 per cent the station thermal efficiency account must be looked into, and, of course, the cost account also. If as little as 1 per cent high concentration in the boiler water, with its baneful effects, may be expected.

### Watch the Sodium Chloride of the Concentrated Water

Now the simplest of all means exists, if chemical test facilities of very elementary sort are available, by which the power plant engineer may determine very accurately the percentage of feed water blown off (or blown off and leaking away combined) or its reciprocal, the concentration of the feed water in the boilers. Practically all power plant water contains common salt, sodium chloride. Sodium chloride does not undergo any changes in the actions and reactions which make other chemical substances in the water the source of so much power plant trouble. Therefore if the amounts of sodium chloride in the concentrated water of the boilers and in the feed water are determined the one figure will be much higher than the other and the ratio will be the ratio of concentration of the boiler water compared with the feed water. Its reciprocal, expressed as a percentage, will be the percentage of water blown off (or blown off and leaking combined). Right here it may be noted that if track is kept of the water intentionally blown off the difference between the percentage determined as above will be a direct and very excellent measure of the quantity leaking through valves which need repair.

### Feed Water Analysis Is Not Enough

The problems of corrosion prevention and scale prevention are jointly handled by maintenance of proper alkalinity. However, there is much confusion and misinformation on this subject. It is usual where water treatment is undertaken to base the treatment on analysis of feed water and to "let it go at that."

Such procedure is wrong, as can be illustrated in this way. One does not run an automobile rapidly down a straight road by manipulating the steering wheel so as reasonably to insure that the plane of the front wheels is parallel to the length of the car, taking the worm gear and sector, reach rods, etc., all into due consideration. One keeps his eye fixed down the road ahead, and the steering wheel is moved a little this way and that so that the sides of the road, as they seem to speed past, make no objectionable approaches to nor recessions from the car. In short, one's attitude is pragmatic, and so it should be with water treatment.

Analysis of the feed water, elaborate or otherwise, is the proper step for a beginning. A decision must first be reached as to *what* should be used as treating agents. The analysis, elaborate or otherwise, might almost as well be qualitative as quantitative, and the result will indicate what should be used. This should be used as the automobile is steered. The *concentrated water* in the boilers should be examined, tested, analyzed. This will show when too little or too much of the one or more kinds of treating reagents is being used, so that proper corrective action can be taken. This will furnish a safe guide. If one bases quantities of reagents on analyses

of feed water, in ninety-nine cases out of a hundred he will be fooling himself, as he might do also by watching the feed water after the reagents are in the water but before the water is in the boilers. It is the *concentrated water in the boilers* which must be watched.

Power plants naturally differ enormously in the variable factors entering the water treatment problem. Electric railway power plants have a proverbially variable load. Most of them are now steam turbine stations and most steam turbines work with surface condensers. If the condenser circulating water is in any way bad the tubes will leak and contaminate the hot-well water. The sodium chloride content of the contaminated hot-well water again furnishes the control guidance.

### Make-Up and Circulating Water Must Be Analyzed Also

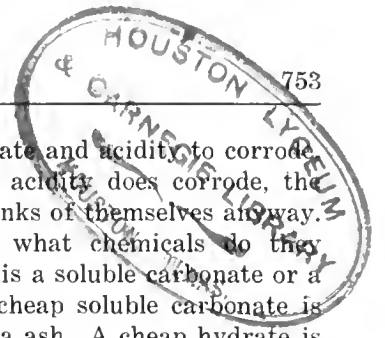
Below a certain limit of salinity the hot-well water is good for boiler feeding; above a certain limit it is unsuitable. The limit of salinity above which the contaminated hot-well water is no longer acceptable as feed water depends upon the quality and cost of the make-up water. If make-up water is free, for instance, the standard set for comparative freedom of hot-well water from condenser leakage contamination should be very rigorous, provided that the make-up water is of good quality and the condenser circulating water is of poor quality. It comes down ultimately to the writing of an equation properly relating the important and somewhat numerous terms.

Satisfactory boiler feed water at the minimum cost is the desideratum. It is the corrosive, scale-forming, and priming properties of the waters which are to be evaluated, not merely the salinity values. Thus analyses in some form of condenser circulating and make-up water are required. Upon such analyses the suitable working standards are calculated. Then salinity determinations alone suffice to dictate the admission or rejection of hot-well water to the feed lines.

The hot-wells of the various condensers in a plant have to be dealt with upon an individual basis. In most modern stations the number of generating units is not great. Therefore if the hot-well water from any one of them becomes unduly contaminated by condenser-tube leakage and consequently the hot-well water is to be rejected it follows that a large proportion of additional make-up water needs to be immediately admitted to the feed lines. On the other hand the water from any individual hot-well may be so contaminated as to make it in itself unsuitable for boiler feed water and yet when it has added to it the water from other condensers which at the time have only slight leakage the resulting mixture may be of entirely satisfactory quality.

### Sometimes Tests at Very Short Intervals Are Needed

The practical way of handling this is, of course, to have one limit for individual condenser hot-well water and another and stricter limit for the salinity of the general mixture of feed water about to enter the feed lines. If the circulating water is highly corrosive and therefore serious condenser tube leakage is imminent in any condenser at any time, it becomes necessary to make routine tests of the salinity of individual con-



denser hot-well water at short intervals, let us say at one hour intervals. Likewise it is necessary to make salinity tests of the general mixture of water about to enter the feed lines at the same or even shorter intervals.

A very excellent way of maintaining proper standard of feed water salinity is to make the determinations on the general mixture of feed water at quite short intervals and whenever excess above the standard is found immediately to make tests of all the individual condenser hot wells which are operating, rejecting the water of the condenser which has the highest salinity regardless of what the salinity may be. While this is advantageous it necessitates *quantitative* determinations of the individual condenser hot-well salinities, whereas determinations which merely show whether salinity of a water is above or below the set standard are merely *qualitative* and therefore simpler to make. It is possible to arrange both sorts of tests so that the manipulation will be so simple that it can be readily performed by engineers entirely untrained in chemistry. In fact such simplicity is quite essential for practical station operation.

### Feed Water Softeners Have Their Place

After the question of what hot-well water to accept for feed water and what to reject has been settled the problems of the general feed water treatment come up for solution. In those plants where surface condensers are used and yet the use of hot-well water is a matter troublesome even though immensely worth while financially the purification of the feed water mixture by a softening system is hardly feasible and, further, it is hardly necessary. It is such plants which in the main I am discussing. Occasionally where the make-up water is quite bad but the circulating water is fairly good, and therefore does little in the way of contaminating the hot-well water, a softening system is used to bring up the quality of the make-up water. In these cases the softening system may be of reasonable size and cost. But a softening system to handle the entire feed water of a power plant, whether the plant is one using no hot-well water or all the hot-well water possible, is a proposition formidable in first cost and liable to prove disappointing in results. Such systems have substantially no representation in American practice. If the water which such a softener would be able to handle were very bad the results would almost certainly be disappointing, and if the water were not very bad the softener would be unnecessary anyway.

Although as has been shown, a water softener is limited in its scope, and although boilers are supposed to generate steam and not to serve incidentally as chemical reagent tanks, chemical water treatment of the feed water of the representative modern power plant is necessary. Further, it may be unequivocally stated that to permit the boilers to serve incidentally as reaction tanks, provided there is proper control, is far better

than to allow scale to accumulate and acidity to corrode. If scale does accumulate and acidity does corrode, the boilers are making reaction tanks of themselves anyway.

If boilers need chemicals, what chemicals do they need? The essential chemical is a soluble carbonate or a soluble hydrate, or both. A cheap soluble carbonate is sodium carbonate, that is, soda ash. A cheap hydrate is lime, but for boiler internal use it is unsatisfactory in that it ultimately increases the suspended solid matter in the boiler. A soluble hydrate free from this disadvantage is sodium hydrate, that is, caustic soda. It costs more than lime, but its cost is not prohibitive. As a basis of judgment for the treatment needed, whether full qualitative analyses are made or not, the fundamental requisite is knowledge of the hardness and the alkalinity of the feed water. Hardness should be determined by the soap test and alkalinity by the use of two indicators, mythal orange and phenolphthaleine. The results of these tests will determine whether soda



Good coal for railways is getting scarcer daily

ash will be sufficient or whether caustic soda should be used to supplement it.

Any calculations which are made of the quantities to be used should be regarded as merely tentative. The treatment should be started and the concentrated water in the boilers should be tested for hardness (by the soap test), and alkalinity (by the mythal orange and phenolphthaleine tests). The latter quality, by the way, is sometimes called the "causticity." If the hardness does not come down to very low values it is evident that insufficient treatment is being given. If the alkalinity to mythal orange does not numerically exceed the hardness, calcium sulphate is present and hard scale is forming. The soda ash should then be increased until the alkalinity to mythal orange does exceed the hardness. If the alkalinity to mythal orange accumulates to high values and at the same time the hardness comes down to very low values, as for instance two parts per 100,000 parts of water, the amount of soda ash should be decreased.

### "Hardness" May Be Temporary or Permanent

The use of caustic soda is to prevent corrosion. If the feed water has high temporary hardness (that is if it contains bicarbonates of calcium and magnesium) and low permanent hardness (due to calcium sulphate) the use of caustic soda alone or supplementing soda ash may be necessary. It should be borne in mind, however, that soda ash becomes partially converted to caustic soda under the conditions of temperature and pressure in the boilers. In other words, the tests made on the concentrated water in the boilers will show the presence of caustic soda even though soda ash may be the sole treating agent put into the feed water. Therefore in many cases the supplementary use of caustic soda is not necessary.

In turbine stations which have good circulating water and, therefore, but little tendency to hot-well water contamination through tube leakage, it is well so to regu-



# Car Bodies Must Be Designed for Economy as Well as Strength

*By Norman Litchfield*

**The Modern Electric Railway Car Is a Truss in which the Weight Is Largely Carried by the Sides of the Body**

**I**N A PREVIOUS article the writer gave a general classification of electric railways cars into several distinctive types, varying more or less in construction to meet the varying conditions of service for which they are designed. The difference noted therein had to do with arrangement rather than with principles of construction. All of the types contain essential elements in common, whether the service be, on the one hand, of the extreme light-weight, one-man character, or on the other, the heaviest train operation.

These essential and common elements may be enumerated as follows: (1) Safety and comfort of passengers. (2) Ability to carry the load and withstand reasonable shocks. (3) Durability. (4) Ease of manufacture and repair. (5) Minimum weight.

The primary feature from a structural standpoint is the ability to carry the load and to withstand end shocks. The relative importance of the two subdivisions of load and end shocks will depend largely on the character of service, as each different class of service contains one or more controlling elements which either may be absent entirely in the others or may be of less consequence. Variation in the design may thus be permitted, not so much in the fundamental principles as in the degree of intensity which one feature bears to the whole.

## **In Steam Freight Cars Buffing Strains Predominate**

A good instance of this is a freight car in steam trunk-line service, in which case cars are operated in long trains, pulled or pushed by a locomotive at the extreme end, or dropped down the grade of a "hog back" freight yard against a bumping post. All of

*(Concluded from page 753)*

late the feed water treatment as to prevent undue accumulation of caustic soda in the concentrated boiler water. It should be present in no greater quantity than is the sodium sulphate resulting from the elimination of hard scale-forming matter by the soda ash acting in the feed water to convert calcium sulphate to calcium carbonate.

In the above discussion the technique of water tests has not been gone into. All but one of the tests mentioned are simple, and that one is by no means difficult. The salt test and the hardness and alkalinity tests to mythal orange and phenolthaleine are so very simple that anyone unacquainted with chemistry can readily be taught to make them. It is unnecessary to describe them here and to show how they can be performed with least manipulation. After all, in my opinion, the main thing about power plant water treatment is its philosophy, not its technique.

these are conditions combining to produce enormous buffing strains, which thus become the controlling features. The importance of this feature is well recognized and its effect is summed up in the 1915 report of the M. C. B. committee on car construction which contains the following:

During the past year the committee has given careful consideration to the various types of existing freight-car designs, and has investigated current troubles and analyzed causes for such troubles. A large number of failures can be traced directly to weak center-sill construction and to incorrect analysis of draft-gear effect on center-sill construction.

The committee then proceeds to the consideration of the intensity of the end force which should be allowed for, and concludes that this should be assumed equivalent to a static load or steady pressure of 250,000 lb. Some idea of the relation that this load bears to ordinary electric car service can be obtained by considering that a typical double-truck city surface car with passenger load will weigh at least 50,000 lb., and that a force of 250,000 lb. would be about sufficient to slide the wheels of a train of twenty such cars coupled together.

Just as we have the standard freight car at one end of the scale, so at the other is the ultra light-weight car for city service, wherein the operating speeds are so low as to make the end forces practically negligible as a factor in the car construction.

A somewhat parallel case in its effect on design is that of passenger interchange, or facility in loading and unloading on a pay-as-you-enter surface car where it is of prime importance to have ample platform capacity to permit the picking up of a large number of passengers. Of only secondary importance is the necessity for making the steps as low as possible. These features introduce a condition of an overhung weight which must be borne on dropped platform sills. They are points which do not have to be given as much weight in the design of a car to operate in service where the station platforms are level with the car and platform floor, thus permitting the use of a continuous straight sill.

## **Passenger Interchange Needs Dictate Features of Car Design**

Detail differences and distinction could be multiplied and cited at length, but these soon become evident to the designer as he studies his own problem, and consideration of the structure of any fairly representative car will focus attention to the chief essentials. For this purpose a short analysis is given in the present article of a level-floor car body weighing with equipment approximately 40,000 lb., and designed to carry a maximum load of 160 passengers weighing 140 lb. each.

The car body can be considered simply as a load-carrying structure or bridge, the abutments or points of support being the center plates of the trucks. It

is customary to provide clearance between the body and the truck side bearings, to allow the body to rock slightly to improve riding qualities and to give ease in rounding curves, so that the side bearings cannot be considered as points of support. Cross members or bolsters are provided to carry the load of the sides and the roof to the center plates. These are designed as cantilevers resting on the center plates. The detail design of these bolsters will be discussed later, attention being given first to the longitudinal structure of the car, in relation to its function

of carrying the load from bolster to bolster. There are various types of floor frames, but in general they consist of the following main members: Two side sills, two center sills, two end sills, two bolsters and two main cross-bearers. The choice as to whether the load shall be carried equally by all longitudinal sills, by the center sills alone, or by the side sills alone has been influenced in the past by the conditions of service, the nature of the materials used in the car construction and the methods of manufacture. Thus early types of freight cars had truss rods under

each sill, so that each would carry its portion of the load, and cross members or "needle beams" were provided underneath the longitudinal members to distribute the load more or less evenly among them all. As the length of freight trains increased, the buffing shocks became excessive. As pointed out in the foregoing, they soon became a controlling feature, and forced the use of powerfully constructed center sills and, as it were, automatically the center sills became the chief load-carrying members. This followed because they had necessarily to be built strong enough to resist the end strains, and the structure thus formed was available for carrying the vertical loads. The same feature has had its influence in the construction of passenger cars for high-speed trunk-line service in long trains, many of which are constructed with heavy center sills. In these the side sills are comparatively light and supported from the center sills at a number of points by cantilever arms.

But on cars for electric service the center sills have not been very generally used for load-carrying purposes and for two reasons. One is that the attaching of the electric and air-brake apparatus to the bottom of the car makes it undesirable, from the standpoints of both installation and inspection, to have a deep center sill. The other is that the conditions on the usual electric road are not such as to be likely to impose any excessive end strains. Furthermore, the sides of the car have in any event to be built sufficiently deep to provide standing height and the necessary air space for passengers and hence, as the sides are there for these purposes, they are also economically available for use as load-bearing members. The center sills are, therefore, as a general rule made comparatively light, and while they carry a portion of the passenger and car equipment load directly to the bolsters, they cannot support the entire load of themselves. They are, therefore, reinforced or propped up by two cross-

bearers which carry the excess load to the side frames.

The side frames thus get a combined load consisting of their own weight, that of the roof, a fairly uniformly distributed load of that portion of the passengers, floor and apparatus directly supported by the side sills, two concentrated loads at the cross-bearers, and an overhung load outside the bolsters.

To meet these conditions various forms of side construction have been devised, and those in general use may be divided into three main classes: (1) Truss rod,

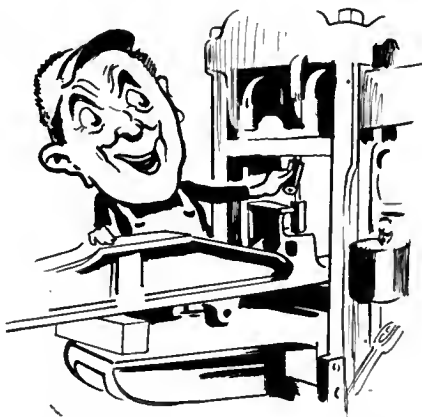
(2) plate girder, and (3) framed truss. The origin of the first of these, the truss rod, dates back to the early simple roof and bridge trusses wherein, when the distance to be spanned became too great for a simple beam, resort was had to a truss rod and queen post to prop up the beam at the center. This plan naturally was adopted for the same reason in car construction, but it was soon found to be inadequate in itself, as it provided no stiffness to resist the oscillations set up by the motion of the car along the track. Consequently it became the practice to use deep planks set on edge on the tops

of the side sills, and bolted thereto, these being known as truss planks. These also were found insufficient, and stiffening trusses were added. These consisted of wooden struts carefully fitted between the sill and the belt rails, and tied together with iron rods put into initial tension with turnbuckles. These trusses were also used to help support the overhung platform loads. As these trusses were at best very flexible the truss-rod lent itself admirably for use with them, but with the advent of steel in car construction the truss-rod became unnecessary. The side frame in itself is now sufficiently strong and rigid to carry the load without further reinforcement.

The earliest form of steel-side construction was that in which the load was carried on a structure at or below the floor level. It consisted either of a pressed or built-up beam, deepened at the center and from its shape generally known as a "fish-belly" girder. This was eminently well adapted to a car in which, as at first, only the underframe was of steel, the sheathing, posts and roof being as yet of wood.

With the further use of steel for side posts and sheathing, it was at once evident that for comparatively light service, with small buffing strains, the "fish-belly" side construction was superfluous. The belt rail, side sill and sheathing in themselves formed a plate girder simple in construction and sufficiently strong and stiff for a car having no doors in the sides between bolsters. This permitted the use of light side posts and roof construction, and gave a very satisfactory structure.

When the congested traffic conditions in the larger cities began to force the use of additional doors in the sides of rapid transit cars in order to provide quick passenger interchange, some other method than the side plate-girder had to be used as the doors cut the girder in half. The designer thus found himself confronted by three alternatives: First, to resort to



The bolster is rightly named for it is a mighty important part of the truck



All parts of the car framing shall be so proportioned that the sum of the maximum unit stresses shall not exceed the following amounts in pounds per square inch, except as modified in sections 6 and 18. These stresses, unless otherwise stated, are for steel having an ultimate strength of from 50,000 to 65,000 lb. per square inch. When other materials are used they shall bear the same proportion to the ultimate strength of the material used.

**Bolster of rolled steel**—Stress shall not exceed 12,500 lb. per square inch.

**Sills and framing of rolled steel**—Stress shall not exceed 16,000 lb. per square inch.

When cast steel is used the allowable stresses may be the same as for rolled steel, except tension stresses, which must be at least 20 per cent less than those for rolled steel as specified above.

For members in compression the stresses shall be determined by the following formula:

$$\text{Steel } 16,000 - 70 \frac{L}{R}$$

In the above formula  $L$  = length in inches.

$R$  = least radius of gyration in inches.

Shear, other than buffing, 10,000 lb. per square inch

Bearing, other than buffing, 20,000 lb. per square inch

Shear, buffing, 12,000 lb. per square inch

Bearing, buffing, 24,000 lb. per square inch

The foregoing stresses are based on the assumption that the maximum end shock due to buffing shall be assumed as a static load of 400,000 lb. applied horizontally at the resultant line of the forces acting at the center line of the buffing mechanism and at the center line of the draft gear respectively, and shall be assumed to be resisted by all continuous longitudinal underframe members below floor level, provided such members are sufficiently tied together to act in unison. Calculations for resistance to buffing shocks shall be based only on underframe members below floor level.

These underframe members may be considered supported against buckling vertically by the superstructures between center plates at cross-bearers to the extent that the strength of the superstructure cross-bearers and attachments is available for that purpose.

For electric cars operated on lines where electricity is the only motive power, and the total weight of trains does not exceed 600,000 lb. the static load may be assumed to be 200,000 lb.

All connections, except those specified for end construction, shall be designed for the maximum load to which the member connected shall be subject; and secondary stresses in any members caused by eccentric loads shall be combined with the direct stresses in such members. The maximum fiber stress in any member subject to both direct and secondary stresses may be taken at 20 per cent greater than those given in section 20; but the direct stresses considered above must not exceed the allowable stresses.

With regard to vertical end members, the Postal specification requires:

For electric cars operated on lines where electricity is the only motive power, and the total weight of trains does not exceed 600,000 lb., the sum of the section moduli of the vertical end members shall be not less than forty, and the section moduli of the main members, either forming or adjacent to the door posts, shall be not less than 75 per cent of this amount.

The horizontal reactions of all vertical end members at the top shall be calculated from an assumed external horizontal force, applied 18 in. above floor line, to all vertical members in proportion to their respective section moduli, such force being of sufficient amount to cause bending of all vertical members acting together, and top connections of vertical end members shall be designed for their reactions. The bottom connections shall be sufficient to develop the full horizontal shearing value of such members.

Except when vertical end members shall bear directly against or be attached directly to longitudinal members at either top or bottom, the assumed reactions shall be considered as loads applied to whatever construction is used at end sill or end plate, and both these last members shall have section moduli, respectively, sufficient to prevent their failure horizontally before that of the vertical end members.

Other specifications make allowance for oscillation, either by assuming as high as 25 per cent additional load or by reducing the allowable unit stress as low as 12,500 lb. per square inch.

The Postal specifications may be taken as representing good practice for electric car service as far as unit stresses are concerned, and also for buffing strains for cars in rapid transit service where speeds are high. For lower speeds and light trains the buffing strains may be reduced, as these will vary with the speed and with the energy of the moving mass. Thus if 200,000 lb. is considered to be sufficient for a maximum speed

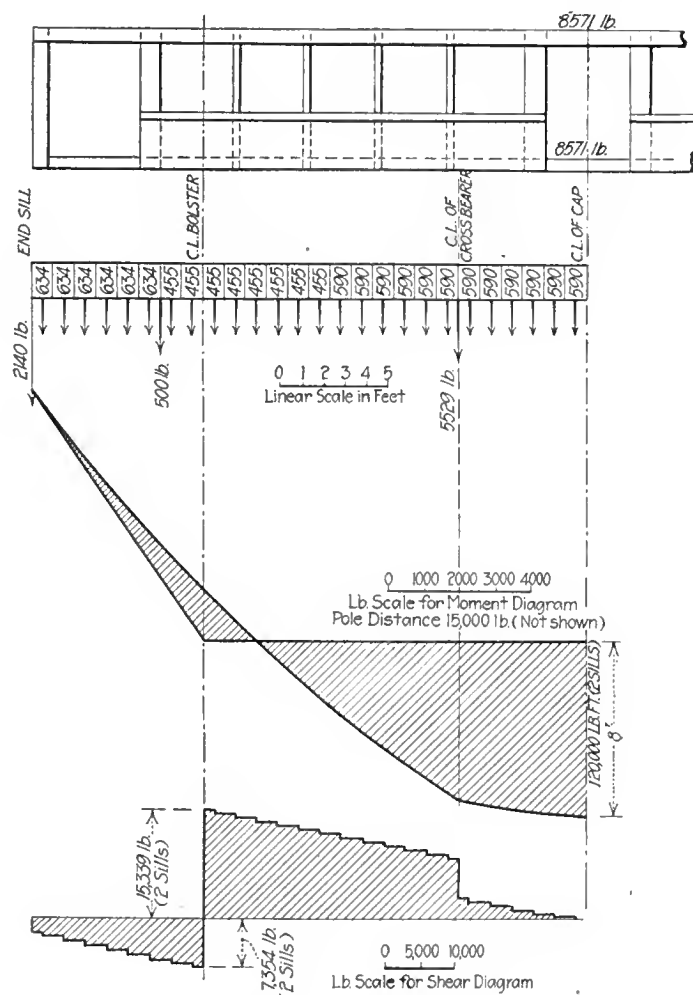


Fig. 4—Loading, Moment and Shear Diagrams of Side Sills

of 60 m.p.h., then for a city surface car whose speed will not exceed 15 m.p.h., the maximum end force would probably not exceed 12,500 lb., which for a car weighing 50,000 lb. with load is equivalent to a retardation rate of between 5 and 6 m.p.h.p.s., and would permit of approximately double that amount before the elastic limit of the material would be exceeded.

In the design of parts under compression particular attention should be paid to proper bracing, and in fact it may be stated that, throughout, care must be taken that the structure is sufficiently rigid. It must be remembered that strength and rigidity are not necessarily synonymous, and the latter quality must be obtained by the proper reinforcement against buckling of parts in compression, and gusseting of joints subject to wearing action. On this point the Master Car Builders' Association has ruled that the length of center or draft-sill members between braces shall not exceed twenty times the depth of the members measured in the direction in which buckling might take place.



# Protecting Car Equipment Effectively Against Lightning

By R. T. Wagner

General Electric Company, Schenectady, N. Y.

## The Car-Type Aluminum Arrester Has Made Good as Records from Users Show—How Best to Install and Maintain Such Arresters

IT IS the purpose of this article to consider protection against lightning in localities where severe lightning is a menace to good operation. The problem is considered in its relation to those electric railways which know by experience that lightning protection is necessary.

The superlative merits of the aluminum (electrolytic) type of arrester are no longer a subject of discussion: it is widely admitted that this type of arrester is the most efficient. Where the electrolytic type of arrester is not used there is some reason other than the efficiency of the arrester for the use of another type.

### Superiority of Aluminum Type Worth Extra Cost and Trouble

The question considered in this article is whether the electrolytic type of arrester is suitable for electric railways operating in hazardous localities. Is the protection worth the cost? The electrolytic arrester individually costs more than any other type, requires more frequent and careful attention and has a higher maintenance cost. It will be shown that taken in the aggregate, considering the protection secured and the number of arresters required, the first cost per unit is not uneconomical, the attention required is not burdensome and the maintenance is not excessive.

The 600-volt arrester has two aluminum cells connected in series directly across the circuit or apparatus to be protected. It is an electrical safety valve acting somewhat like the well-known steam safety valve. When the pressure reaches a certain point, the valve opens and a discharge occurs until the normal pressure is reached. To put it in another way, the arrester offers an extremely high resistance to the flow of current at normal potential and allows a free discharge of current at higher, or lightning, potential.

Without going into the theory of lightning arrester design, it may be pointed out that, to give protection, an arrester should discharge at low rises in lightning potential, should freely discharge disturbance, should not allow the line current to follow the lightning discharge, and should not be damaged in these processes. The aluminum arrester meets these four requirements. In one important respect it is more effective than the alternating-current electrolytic arrester, universally used for the protection of large power plants. It does not have a gap. The slightest rise of potential due to lightning causes a discharge.

The electrolytic arrester owes its protective qualities in part to the fact that it is a condenser. The films on the aluminum plates form the plates of the condenser. This condenser is of value in absorbing lightning disturbances of high frequency. The arrester

illustrated in Fig. 1 has a capacitance of between two and three microfarads. As a condenser arrester, the aluminum arrester will therefore offer a high degree of protection, but the condenser effect is not relied upon alone to give protection. The main reliance for protection is placed on the valve effect which permits the quick discharge to ground of large quantities of lightning and, hence, immediate and complete relief from the stress on the insulation due to the lightning potential.

### Answers to Questionnaire Show Practically Perfect Protection

The question of whether this condenser-electrolytic arrester is worth the cost to an electric railway for protection against lightning may be judged on its past performance, records of which are available.

To obtain information on these arresters a questionnaire was sent to a number of railways that had been using them for several years. Twenty-eight replies were received. Sixteen of the companies were located in the Southern or South Atlantic States, where lightning is known to be severe, and the remainder were located in the Middle West. The twenty-eight roads had had 1291 cars equipped with aluminum arresters for periods ranging from one to seven years, amounting to a total of 4129 arrester-years. *They reported just twenty-four cases of damage by lightning.*

Among the cases of lightning damage there were two damaged arresters, one burnt-out coil on a control circuit, and four doubtful cases of motor damage, possibly due to water in the motors.

Had these 1291 cars been operated for only one year with even more than twenty-four total cases of trouble, the record would have been a remarkable one. It shows conclusively that lightning damage to cars protected by aluminum arresters is practically negligible.

Would lightning losses have been suffered had these cars not been protected? The replies to this question were disappointing because many companies did not begin to keep records until after the aluminum arresters had been installed, so that a comparison with previous years cannot be made directly. About half gave no information whatever. Three companies replied that they had no records previous to the installing of aluminum arresters because trolleys had been pulled down and service discontinued during lightning storms on account of frequent damage to motors. Seven companies reported a total of 225 cases of damage, an average of fifteen a season. One reported 688 cases in five years, an average of 137 a year, and another 386 in six years, an average of sixty-four a year.

Some of the losses reported occurred to cars that had no arresters; some occurred to cars that had other arresters, part occurred just previous to aluminum arrester installation, and others occurred after aluminum



arresters had been installed on part of the cars. The road that reported 688 cases of trouble in five years had, at the beginning of 1917, 181 cars equipped with aluminum arresters which had been installed during the previous five years. In that time not a single case of trouble had occurred to those cars. The number of arresters now is being greatly increased.

While these records are somewhat meager they show unquestionably that the cars would have suffered damage had aluminum arresters not been used.

It remains to be shown whether or not the protection was obtained at too great a cost. In the questionnaire the following queries appeared: "What was the cost per arrester per year for installation in the spring, renewal of parts and removal in the fall? One company with thirteen arresters, in service for two years reported a total expenditure of 50 cents for all repairs. Another, with eighty-one arresters in service for seven years, reported an annual cost per arrester of 90 cents, not including repair parts. Ten companies, having a total of 499 arresters in use for from one to four years, gave full answer to this question. The lowest maintenance cost was 50 cents, the highest was \$3 and the average was \$1.58. The records, therefore, show that the maintenance of these arresters was not excessive, even if the highest cost, \$3, be taken as representative.

An aluminum arrester of the type shown in Fig. 1 costs about \$19. Allowing a life of five years, which is very conservative, the capital cost per year is \$3.80. Adding to this the maintenance cost at \$1.60, and interest at 6 per cent, or \$1.14, the cost per year is \$6.54, not including installation which would be about the same for any type of arrester. This is the cost per year for insurance against lightning, and it differs from other insurance because it guarantees that there will be practically no loss. The cost of lightning damage varies greatly, depending upon the apparatus affected and the extent of the damages. Of least importance, except under some circumstances at night, is the burning out of the lighting circuit.

Damages to other parts of the equipment ordinarily involve taking the car immediately out of service. Whether it goes in on its own power or is towed in the cost would be \$2 or \$3 at least. The most frequent cause of trouble is damage to the armature coils, and the cost of repairs depends on whether the armature is burned out entirely or only a few coils are destroyed, and also on the size and age of the motor. The repair of only a few coils might cost \$10 to \$15. Rewinding the armature completely might cost \$60 to \$70. Old motors, in which the insulation has deteriorated, are most likely to be damaged by lightning and are expensive to repair.

One company figures that it costs \$15 to \$20 to repair

a new motor and \$50 to \$60 to repair an old one. On another road the costs vary from \$4 to \$65, the average being in the neighborhood of \$25. Three large systems in the East put the cost at \$50, \$60 and \$75 respectively.

Air compressors may be damaged also. A few coils would cost from \$3 to \$6 and totally rewinding the armature would cost \$15 to \$18. If the control circuit is affected the damage may be only a hole in the metal case of the controller which, however, requires patching, a burnt-out terminal board which would cost \$10 to \$15 to replace, or a blow-out coil which would cost \$9 to \$12.

These are only rough averages, but railway men know this item of cost and can readily judge whether the cost of the arresters is justified. It can hardly be doubted that for the kind of a system under discussion, one operating in a locality of severe and frequent lightning storms, the arrester is worth its cost, on the grounds of saving repair expenses only. The arresters pay for themselves even if the gain which comes from keeping the cars operating in the severest storms is not taken into account. This gain cannot be measured in dollars, but it is undoubtedly worth much

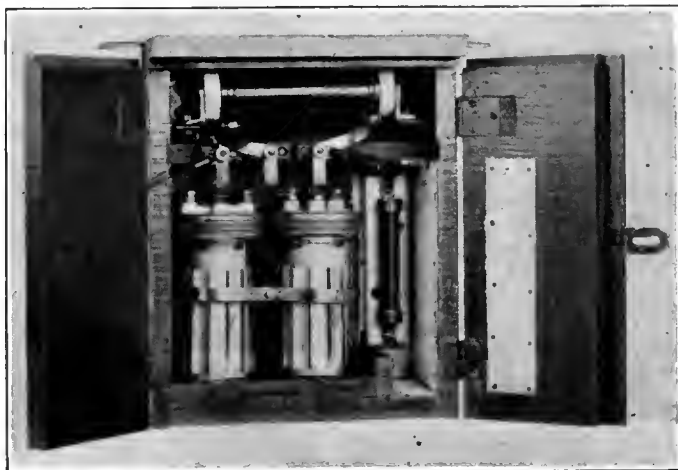


FIG. 1—ELECTROLYTIC LIGHTNING ARRESTER FOR USE ON CARS

more to a public utility than the cost of repairs.

In considering damages from lightning it should always be remembered that a damaged car represents much more than the cost of repairing the damages, that is, something more than the mere cost of the mechanical work and the material necessary to rewind the motor and put the car back into commission. First and most important, a damaged car causes inconvenience to the public on account of the interrupted schedule, not only to the actual passengers but also to prospective passengers. This inconvenience is aggravated by its coming at a time when the public most urgently requires transportation.

In the second place a dead car represents dead capital, that is, an interest charge with no compensating revenue. Again, for every car out of commission, reserves in rolling stock or motors have to be provided if service is to be maintained. This also represents dead capital which may be reduced if protection against lightning troubles can be insured. Considering all of these factors and the past performance of these arresters it cannot be doubted that the aluminum arrester is worth its cost. This is particularly true under present conditions, when nearly all railways are working their cars to the limit, and many really need additional equipments. Any loss of cars due to lightning will not only be high in the cost of repairs, but also unusually detrimental to service.

The operating man is likely to ask if an inspector can tell whether or not an arrester is in good operating condition. This is indicated by the record of protection as previously given. Either the arresters

required very little attention or the necessary care was ascertained readily by the inspectors. Otherwise the arresters would not have given practically perfect protection at such a low maintenance cost. However, as the active elements of the arrester can be seen plainly upon opening the arrester doors, an inspector can readily determine its condition. The color of the electrolyte gives a good indication. As the arrester is also a condenser, its condition may also be judged from the spark when the arrester fuse is pulled. There is no danger of an internal short-circuit between con-

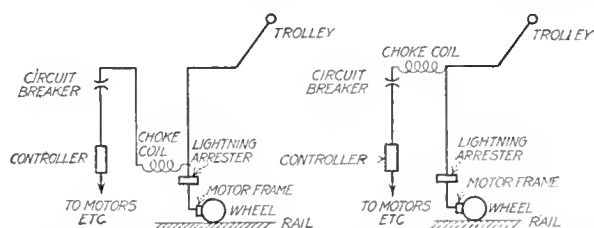


FIG. 2—PROPER ARRESTER CIRCUIT ARRANGEMENT FOR SINGLE-END CARS. FIG. 3—WIRING FOR ROOF OR VESTIBULE LOCATION OF ARRESTER

denser plates, and the films are kept formed as long as the arrester is on the circuit.

The aluminum type of arrester is frequently criticised on the grounds of its requiring frequent and elaborate inspection. One of the questions asked in the questionnaire was: "Are aluminum arresters inspected regularly?" Fifteen companies gave complete replies as follows: Monthly and after storms, four; weekly and after storms, three; weekly, two; every ten days, two; four times during the season and after storms, one; every two weeks and after storms, one; once a year, one; every 1000 miles, one.

These companies got protection at a low maintenance cost, and certainly the inspection could not be considered burdensome, especially as the regular inspections were made as part of the usual inspection of the equipments. The best method is to inspect the arresters after every storm and at the time of the regular car inspections which usually are given at intervals of two weeks or less.

### Arrester Connections, Choke Coils, Grounding

In order to obtain the full benefit of the aluminum arrester it must be properly installed. The most important consideration is that the discharge circuit should be the shortest and most direct path from line to ground, and that no wire that may carry lightning should be near nor parallel for any considerable length any of the other wiring. This prevents damage being done by an induced charge.

The most desirable connection is shown in Figs. 2 and 4. The latter is shown for a car with double-end control, but applies equally well to single-end cars, one-half of the diagram only being considered. With this connection the arrester is located under the car floor and the wire to the arrester is kept away from all other wires.

The connection shown in Fig. 3 is sometimes used when it is desired to place the arresters on the car roof or in the motorman's vestibule. This connection is not as effective as the one shown in Fig. 2 because there is a greater length of wire in the arrester circuit.

The wires to and from the arrester should not be run in iron conduit, on account of the choking effect of a long piece of the latter.

Choke coils should always be used as they increase the effectiveness of the arresters. These are usually made by winding a few turns of the motor lead on a wooden core. Of the twenty-eight companies referred to above, only one used no coils, one used them on some cars and the remainder used them on all cars.

The grounding of car arresters is, of course, easily taken care of by grounding to the car, truck or frame, the only precaution being to make the ground wire as straight as possible and to attach it securely.

### No Line Arresters Necessary If All Cars Have Aluminum-Cell Type

The question is frequently asked whether it is necessary, when aluminum arresters are used on the cars, to use arresters of the aluminum or some other type on the lines. It is not possible to give a "yes" or "no" answer to this question for the reason that there are insufficient data on which to base an opinion. Some roads have operated with aluminum arresters on the cars and with no arresters on the lines and have not had any lightning troubles on the cars. Most companies using aluminum arresters on the cars have also had some kind of arresters on the lines. The indication is that with aluminum arresters on the cars, properly installed and properly maintained, there is no need for any kind of arrester on the lines as far as protection of the car goes.

This is consistent with theory and practice in the protection of other kinds of apparatus. It has been proved both in the laboratory and in the field that an arrester gives the best protection when installed at the terminals of the apparatus to be protected. In this case the apparatus is the car motor and, therefore, the alumi-

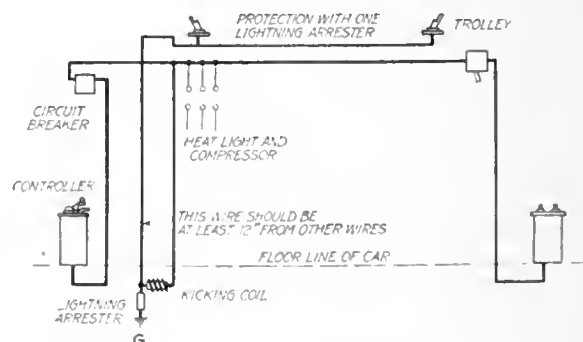


FIG. 4—PROPER ARRESTER CIRCUIT LAYOUT FOR DOUBLE-END CARS

num arrester installed on the car meets the conditions for the best protection.

Line arresters can be considered only as adjuncts of the car arresters. When an arrester of lower "protectability" is used on cars, line arresters should be used to help the car arresters in discharging the lightning disturbances. This, of course, is aside from the protection of any other apparatus on the lines, such as signals, which may require individual protection. Line arresters do give some protection to the line insulating material, but lightning is so often purely local in character that the expense of line arresters for this purpose alone is not justified. They may be

judged of value only as they assist the car arresters to protect the cars.

Probably the most practical answer to this question is that when cars are being equipped with aluminum arresters, no additions need be made to the number of line arresters. A season or two will indicate whether line arresters may be discarded or should be increased in numbers. It will probably be found that the line arresters may be abandoned.

It must be remembered, however, that the aluminum arrester can be held responsible only for the car on which it is installed. If other cars have a lesser degree of protection they have to depend, in part, on the line arresters. Where the trolley insulation is exceptionally weak, as indicated by frequent failures during lightning storms, it may be advisable to use arresters on the lines, although the alternative of improving the insulation should be carefully considered.

### How This Arrester Has Made Good in Denver

This discussion is based on many years of experience. The arrester was first tried out about 1907. In 1910 more than 200 arresters were added by the Denver Tramway to an installation of arresters made in the preceding three years. Cars were rewired in order that the full benefit of the arresters would be attained and an engineer of the General Electric Company co-operated with the Denver Tramway in watching the installation and studying the results. The installation was a success, and the number of arresters has been increased from time to time, so that now in Denver, a city subjected to notoriously severe lightning storms, damage to cars from lightning has now become practically non-existent.

The improvement that followed may best be indicated by the following quotation from the March 16, 1918, issue of *Tram-O-Grams*, a publication of the Denver Tramway, in connection with a failure of power due to transmission troubles.

Here on the plains, up high in the air, electricity has been more of a "devil" than in other altitudes and other cities. Those of you who were living in Denver six or seven years ago will remember how the Tramway spent hundreds of thousands of dollars experimenting with lightning arresters for the cars before a satisfactory one was invented, and how all the cars would stop and their trolley poles would be pulled down every time there was a thunder and lightning storm. They would remain quietly in puddles of rain water until the storm was over. With the usual perverseness of nature the storm always arrived in the middle of the rush hour when the cars were loaded with home-going people.

### New Ticket Books for Employees

Free transportation for employees of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, will be supplied in a new form. The annual card pass will no longer be used. The ordinary form of pass will be a book of tickets for use on the lines within city limits. These books will all be marked for the city or cities in which the tickets may be accepted for transportation and the cover of the book will constitute the pass. In all cases the book must be in plain view of the conductor and the ticket must be detached from it in his presence. Furthermore the book must be handed to the conductor for examination on his request.

## War-Time Problems

### California Public Service Commissioner Discusses Rates, Service and Other Points—Outlines Duties of Regulatory Bodies

MAX THELEN, president of the California Railroad Commission, recently discussed utility rates, service, extensions and finances before an extension course of the University of California. He also made several suggestions as to the duty of the various state commissions with reference to utilities and their war problems.

In California, Mr. Thelen said, 106 formal applications for authority to increase rates were filed with the commission between April 6, 1917, the day on which war was declared to exist, and March 1, 1918. Forty-seven applications have been granted, sixteen have been denied or dismissed and forty-three are now pending. Of the applications pending, more than one-half were not filed until the last two months.

Where an emergency exists and where the usual method of handling rate applications, including a valuation of the property and an audit of the books, fails to meet the situation, the commission does not hesitate to apply emergency measures. To the extent to which short-cuts are necessary to meet the emergency, the board applies them. The commission, Mr. Thelen stated, fully agrees with President Wilson's letter to Secretary McAdoo that it is essential that the utilities be maintained at their maximum efficiency during the war.

Nearly all the public utilities which have applied to the California commission for authority to increase their rates, subsequent to the entry of the United States into the world contest, have specifically stated that they will be content with the same net return which they received before the recent large increases in operating expenses, and that they do not expect to increase their profits during the war.

### ECONOMIES MUST BE SOUGHT

In Mr. Thelen's opinion, electric railways present important service problems. In order to conserve fuel or to reduce operating expenses, or for both purposes, careful consideration should be given by such carriers to the use of skip or stagger stops, the elimination of such car mileage as can be spared without hardship to the public, the reduction of heating, the operation of one-man cars under proper safety regulations, and the substitution of light-weight cars for the heavier cars now commonly in use.

Electric railways in all sections of the United States are making applications to the state commissions and the various local authorities for permission to increase their fares, but Mr. Thelen said that in very few of these instances have the companies given the proper consideration to the reduction of their operating expenses by the methods just mentioned. He believed that utilities should come prepared to show that they had eliminated all unnecessary expense and had introduced all economies of operation compatible with the continuation of reasonably good service.

As for extensions, Mr. Thelen said that while it is not likely, as the problem presents itself now, that usual service extensions in the ordinary course of busi-

ness will be seriously curtailed, each extension or addition involving a major expenditure must be carefully scrutinized to determine how it synchronizes with the requirements of the nation at war.

On the other hand, the requirements for additional light, heat, power and transportation by industries engaged in the production of necessary materials, supplies and food are such as to require imperatively additions and extensions all over the United States. Mr. Thelen considered it essential that the financial strength and stability of the utilities be conserved by deferring capital expenditures not directly needed for war purposes, and that the funds thus conserved and other funds necessary be used for such additions and betterments as would assist most effectively to meet the nation's war requirements.

#### FINANCING IN CALIFORNIA

Notwithstanding the difficulties created by the war, the acquisition of additional funds by public utilities from the sale of securities subsequent to April 6, 1917, has not entirely ceased. Thus the California Railroad Commission, during the eleven months beginning with April 6, 1917, authorized the issuance by public utilities of stocks, bonds and notes having a face value of \$72,828,150 as contrasted with \$99,625,000 during the twelve months ended June 30, 1917, and \$231,644,870 during the twelve months ended June 30, 1916. Of the securities authorized by the commission subsequent to April 6, 1917, \$15,650,000 were for additions and betterments, \$10,900,000 for refunding, \$11,360,000 for collateral, \$34,875,000 for consolidations and reorganizations, and \$32,500 for other miscellaneous purposes. Of the securities thus authorized, \$29,982,000 were capital stock, \$32,520,000 bonds and \$10,275,000 notes.

California, Mr. Thelen said, is fortunate in that a local market for securities authorized by the commission has gradually been created and has largely assisted in meeting the requirements of the public utilities during the war. While to some extent sales have continued to be made locally in the various states of the Union and to a greatly diminished extent and generally on increasingly onerous terms in the financial centers of the country, it seemed clear to Mr. Thelen that most public utilities will not be able, without some form of assistance or encouragement from the federal government, to secure large amounts of additional funds on their own credit in competition with Liberty bonds and other government securities.

#### DUTY OF STATE COMMISSIONS

In the situation which now confronts many of the public utilities, Mr. Thelen stated, the duty of the state commissions is manifestly as follows:

"While providing for the continuation of adequate service, it is the duty of the commissions to act promptly and vigorously on applications for increased rates based on increased operating costs.

"Where the usual methods of rate-making would result in unreasonable delays, short cuts must be applied to meet the emergency conditions.

"The public utilities must be kept in a sound and healthy financial condition, so that they will be able to meet not merely the requirements of their existing patrons but also the additional requirements of the war.

"The state commissions should not wait until the utilities come to them with pleas for assistance. It is their duty to inform themselves by their own investigations, if necessary, concerning the condition of the public utilities under their jurisdiction, and to keep themselves constantly informed."

## Government and Industries Should Get Together

### Mr. Shonts Suggests Plan for Securing Efficiency of Private Operator and Benefits of Government Control

**I**N AN address on April 1 before the Economic Club of Boston T. P. Shonts, president Interborough Rapid Transit Company, New York, N. Y., discussed social reconstruction following the war. Mr. Shonts favored a program of partnership in great industries between the government and industry, and between industry and labor. He said in part:

"Such widespread phenomena as each day's news brings before us, be it Bolshevism or communism in Russia or I. W. W.-ism in America, cannot be waved aside as passing disturbances. They are symptoms of a disorder that demands searching diagnosis and intelligent remedy.

"Privately controlled industry avoids waste but creates a tendency toward monopoly with swollen fortunes. On the other hand, governmental ownership and operation, in the light of experience, spells inefficiency. I believe, however, that the efficiency of private operation and the benefits of governmental control can be secured through a partnership between the government and private industry, thus leaving room for individual initiative with corresponding reward.

"Such a plan is now in successful operation in the city of New York in the case of the contracts between the city and the rapid transit companies, for the construction and operation of the dual system of subway and elevated lines.

"The government of the United States might easily work out a partnership plan for the operation of the steam railroads after the war along the foregoing lines. In this way the railroads will have all the benefits of private management, and the government, through its general control, can bring about a more scientific distribution of traffic.

"What can be done with respect to the railroads can be accomplished in the case of all main industries, thereby saving them from the evil effects of a purely socialistic control and the country from the conduct of business by political methods."

## Patriotic Use for Backs of Transfers

The Connecticut Company is printing on the backs of transfers information regarding the number of employees of the company now in service in the army or the navy. The latest list shows the following numbers of men so employed: Motormen and conductors, 162; inspectors and starters, three; shop employees, thirteen; power station employees, five; line department employees, eight; express department employees, ten, and office employees, twenty-four. The total is thus 225.



# Commerce Delegates Indorse Utility Relief

## Group Meetings of United States Chamber Take Up Topics Connected With Railroad and Highway Transportation and Effect of Government Financing on Industries

**A**BOUT 3000 business men from all sections of the country attended the annual convention of the United States Chamber of Commerce at Chicago last week. Besides the departmental or group sessions, which were held at the Congress Hotel, several general meetings were held in the Auditorium, and among the speakers were Secretaries Daniels and Lane and Lord Reading, special British ambassador.

The group sessions of most interest to electric railway operators were those of Group B (finance) at which the topic considered was the effect of government financing on industries, and of Group C (railroads and highway transportation).

### EFFECT OF GOVERNMENT FINANCING ON INDUSTRIES

The address of Thomas N. McCarter on immediate relief for the utilities, printed in the issue of this paper for April 13, comprised part of the program of the finance group. Another speaker was Daniel R. Forgan, president National City Bank, Chicago, who discussed the Liberty Loan issue. Among other things he said:

"The question which every loyal American must ask himself is: 'How far can I use my individual credit or the credit of my business to purchase government bonds?'

"If an active business man chooses to sell his bond at a loss to some of these final absorbers and thus be ready to take his proper share of the next loan, I think he should be commended—not criticised.

"The business must be subordinate to win the war. The banker's duty is clear. He must give himself—his bank—his influence—his credit to the country's cause."

Another speaker was John V. Farwell, banker, Chicago, who said that organization and morale in our army abroad and in our government and business at home will win the war. It was indeed fortunate that the Federal Reserve System was in operation when the war broke out. Otherwise we would be in a very much worse condition. This system, however, was designed for peace, and something additional was required for war conditions. The War Finance Corporation was so designed. It was better to keep it apart from the Federal Reserve System, and this has been done. The method by which this law will be applied has not been worked out yet, or at least not made public, but undoubtedly the Secretary of the Treasury will be fair. Unfortunately the government cannot directly raise the rates of public utilities, and for this reason it is very necessary for it to do all it can to induce local authorities to do so.

The speaker then discussed the effect of government control during the war through price fixing, financial assistance to corporations and otherwise. It was wise to grant this power to the government, but the trouble may be to get rid of it after the war. For this result, public opinion should be molded, and chambers of com-

merce throughout the country can help greatly in this work.

The final address was by O. M. W. Sprague, professor of economics, Harvard University, who spoke of the effects of the way in which the war is financed on the way in which the government can carry on its program. Where a government expands its purchases and the people do not contract on theirs, prices are bound to increase and credit expands. Where a war is financed on credit expansion, the burden falls principally on owners of securities with fixed incomes and on public utilities with fixed rates of charge. The speaker suggested the passage of a law requiring all persons either to invest a certain percentage of their income, depending upon its amount, in government bonds not of the ordinary type but registered and non-negotiable until after the war, or else to pay a large extra tax.

In the discussion, Walter A. Draper, Cincinnati Traction Company, spoke about the increased cost of labor in electric railway undertakings, made necessary to hold the men. He urged the members of the chamber to take a stand against expenditure of money for municipal improvements during the war, including those improvements which were called for in the franchises of public utilities.

### RAILROAD TRANSPORTATION

The first paper at the railroad session was on "Terminals," and was presented by Edward J. Noonan, chief engineer Chicago Railway Terminal Commission. The speaker explained that in railway operation the terminal problems were the chief ones confronting railroad operators, and their importance was shown by the fact that the investment in terminals is more than the investment in all the rest of railroad property. He also explained that a freight car spends twelve hours in the terminal for every hour outside. After describing the requirements of different classes of terminals he expressed the belief that the solution of the terminal problem, indeed of all railway problems, depended upon a clear conception of the principle that there can be no conflict between the interests of the railroads and those of the public. He argued in favor of greater joint use of railroad terminals, which is more practicable under government operation than formerly. Thus, a local district manager can more easily route cars around a terminal than formerly.

In the discussion a delegate from Baltimore explained that even before the government assumed control, a war committee with representatives from the business interests and the railroads worked out a system of joint use of terminals. Another speaker suggested that if more passenger transportation was diverted to the electric lines there would be less congestion on the steam railroads. The question of autonomous operation of the railroads after the war was discussed, and it was sug-



gested by one speaker that possibly railways in divisions of the country might be operated in territorial groups.

Alba B. Johnson, president Baldwin Locomotive Works, then presented a paper on "Motive Power," abstracted briefly last week. In addition he said that the normal capacity of the locomotive building shops before the war was about 7000 locomotives per annum and rarely have they not been adequate to the needs of the country. The business in the past has either been a feast or famine. Under average conditions the shops had a surplus of about 50 per cent of their capacity for export, although they had not exported that number. Now, of course, all the shops are very busy, most of the work being for export. In his opinion the downfall of the Russian government was caused largely by its failure to meet transportation needs. At present no orders for locomotives can be placed in the United States without the permission of the government. In 1914 the company which he represented turned out from four to five locomotives a week. In December of last year its average was from sixteen to twenty locomotives a day.

#### CAR SHORTAGE ON MARCH 1 AMOUNTED TO MORE THAN 138,000 CARS

Samuel O. Dunn, editor *Railway Age*, then read a paper on "Car Supply." He said, in part: "In 1917, there were only 3 per cent more freight cars and 1 per cent more locomotives than in 1916. The roads handled the enormous traffic of 1917 without any more cars and locomotives than they had had three years before. Furthermore, many of the cars and locomotives used were such as under normal conditions would have been sent to the scrap heap. On March 1, 1918, the net shortage reported was more than 138,000 cars.

"At the rate of eight to ten thousand cars a month, all the car builders could hardly build more than 50,000 or 60,000 before Jan. 1. The total year's output would be 75,000 to 85,000 cars as compared with a minimum of 125,000 necessary to maintain the present equipment.

"In these circumstances it is necessary to do two things—First, the railways and the public must co-operate to secure the maximum utilization of existing locomotives and cars; and second, the railroad administration must give preference to traffic essential to the war and to the public for its subsistence and comfort."

#### FINAL OUTCOME WILL LIE BETWEEN GOVERNMENT PARTNERSHIP AND GOVERNMENT OPERATION

The final paper of the session was one on "Extensions" by Francis H. Sisson, vice-president Guaranty Trust Company, New York, who urged the necessity of creating new wealth, by making up for the destruction of property during the war. In such a program railway extension is necessary. It is more than probable also that water powers now going to waste will be developed. We must plan for these extensions now. In the meantime the railways should keep up maintenance, without which extensions are hardly practicable. The final decision rests on the people, and in it shippers will exercise an important influence. They are now suffering under conditions they largely caused and must lend a helping hand. In considering the final outcome the speaker predicted that the answer might lie some-

where between the words "government partnership" and "government operation."

#### HIGHWAY TRANSPORTATION

A special session was devoted to highway transportation, or that by motor truck. The first paper, that by Roy D. Chapin, chairman highway transportation committee, Council of National Defense, was published in abstract last week.

According to F. A. Seiberling, president Goodyear Tire & Rubber Company, the next speaker: "The 400,000 motor trucks now in service in this country have sounded the death-knell of the short line railroad. All that is needed is the building of hard surfaced brick roads capable of carrying 10-ton trucks at a speed in excess of 20 m.p.h.

"We have approximately 2,500,000 miles of highways designed to carry traffic as it existed prior to the introduction of the motor truck," Mr. Seiberling continued. "It requires no stretch of the imagination to state that within a few years all these roads will go to the scrap heap. It seems desirable to institute at once a separate highway department in which there will be centralized authority and control with a view to providing roads capable of handling all the tonnage that our motor truck equipment can carry, of solid construction—macadam, hard surfaced brick, or concrete."

#### NEARLY 5,000,000 AUTOS AND TRUCKS

The third speaker in the highway transportation group was A. C. Bedford, president Standard Oil Company of New Jersey and chairman of the Petroleum War Service Committee. Mr. Bedford said that at the beginning of 1916 there were about 2,400,000 cars and trucks in the United States while, on Jan. 1, 1918, the official registration was 4,941,276. Roughly speaking, 5,000,000 motor vehicles will require 50,000,000 barrels of gasoline a year, and including gasoline exports to the Allies, the total demand this year will be over 60,000,000 barrels. On Jan. 1, 1918, there were about 351,000 motor trucks in this country and the present output is estimated at about 22,000 a month. Continuing, Mr. Bedford said:

"There remains another problem in connection with the further development of motor truck transportation, and that is the problem of the roads. Existing good roads are deteriorating rapidly, for various reasons, and we all know that when deterioration sets in it is exceedingly rapid unless the roads are currently maintained. Thus, the maintenance of existing highways will require large quantities of asphalt or heavy binders, and more good roads are desired and required if truck transportation is to develop its full efficiency."

The speaker then explained that nearly all of this asphalt has to come from Mexico, Bermuda or Trinidad, but at the present time practically none is imported. Then he said: "There is the additional difficulty of labor for construction and maintenance work on the scale we would like to see. From the viewpoint of the motor truck alone, it would require a large number of men, who probably at this time can be used to better advantage in agricultural, shipbuilding and other industrial work. There is also to be considered the large number of men required to operate motor trucks, as compared with the number in a train crew.

"My feeling, then, as regards the road end of the problem, is that the auto truck transportation plan, especially in its relation to the prosecution of the war, is so important that it should be put into effect to the utmost extent possible, making the most possible use of existing roads, even though no new good roads can be built. With respect to the demand for gasoline for essential purposes, I can only repeat what I said at the outset—it can and shall be met."

#### RESOLUTIONS PASSED

At the meeting on Friday the Chamber passed the resolution for utility relief, suggested by the American Electric Railway Association and published last week.

Other resolutions adopted were a renewal of the pledge made last year to the government of "its full and unqualified support in the prosecution of the war until Prussianism is utterly destroyed"; universal military training; support of Liberty Loan and War Savings and Thrift Stamp campaigns; definite co-operation with shipbuilders to help the production of ships; that "any measure or proposals having for their objects control of industries by the government be subjected to close scrutiny and examination, and that such proposals should be adopted only where there is sufficient evidence indicating that the state of war makes such control more effective for the proper conduct of the war"; discouraging the construction of public buildings and other improvements which will not contribute toward winning the war as well as the erection of industrial plants which cannot be utilized in the prosecution of the war; recommending the appointment of a permanent committee to study the conditions surrounding fixed prices and to provide a formula on which such prices shall be fixed; co-ordination of railroads, water routes and highways for traffic service; the calling of a conference to consider the formulation of a basis for the control and the operation of the railroads after the war, and the development at an early date of the water powers of the country.

### Philadelphia, Washington and Kansas City Go to Pneumatic Door and Step Control

THE tendency toward pneumatic doors and step control is illustrated by four recent cases of importance. One of these is Philadelphia where National Pneumatic 2½-in. x 4½-in. air engines and door and step fittings have been specified for the 100 new double-end cars of the Philadelphia Rapid Transit Company. The others are the Capital Traction Company, the Washington Railway & Electric Company, and the Kansas City Railways.

The Capital Traction Company has not only specified GM 2½-in x 4½-in. engines for twenty new cars, but will install them on fifty-one present pay-as-you-enter cars which are being remodeled to the inclosed vestibule type. The Washington Railway & Electric Company has ordered GM 2½-in. x 4½-in. engines for twenty-five new cars and also for ninety-six end-entrance and seventy-five center-entrance cars. The last named cars may be supplied with a new type of engine control. The Kansas City Railways has also ordered 100 2½-in. x 4½-in. folding-door engines for existing cars.

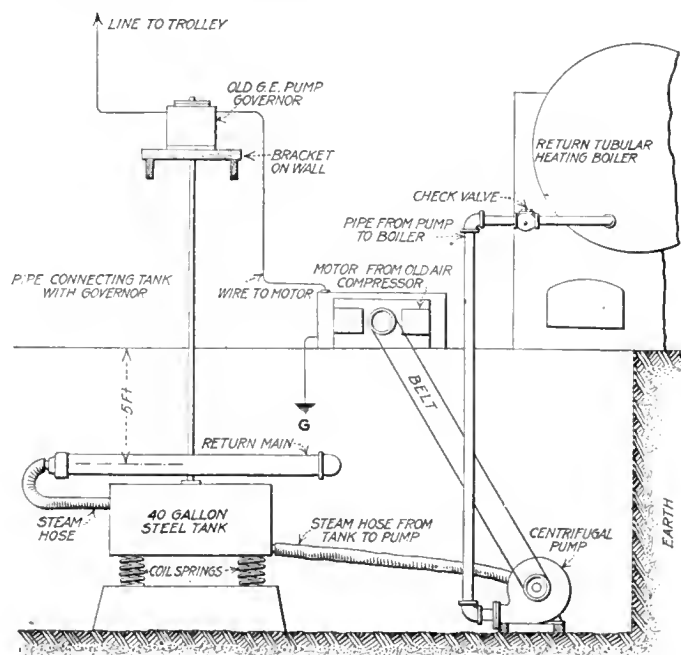
### Automatic Return for Condensate from Heating Pipes to Boiler

By F. J. FOOTE

Master Mechanic Ohio Electric Railway, Columbus, Ohio

AT THE Columbus shops of the Ohio Electric Railway we have a novel arrangement of apparatus for lifting the condensate from the pipes of the heating system and returning it to the heating boiler. This arrangement of apparatus is shown in the accompanying sketch, and the method of its operation is as follows:

The boiler used is of the ordinary return tubular type, and it is set on the ground in the usual manner. Most of the steam-heating coils are in the pits between the tracks, so the condensate flows into a return main



AUTOMATIC STEAM HEATING APPARATUS FOR RETURNING CONDENSATE TO BOILER, OHIO ELECTRIC SHOP

about 5 ft. below the surface of the ground. The end of this return main is connected by means of a steam hose to an old 40-gal. tank, which formerly served as an air reservoir under a car. This tank rests on light coil springs, which compress as the tank fills. The tank is connected by a vertical rod to an old General Electric air-pump governor with diaphragm and spring removed. When the tank settles, due to the weight of the water as it fills, the governor closes a switch and starts an old air-compressor motor, which is belt-connected to the centrifugal pump placed in the bottom of the pit. The water is pumped from the tank through another piece of steam hose and is returned through a pipe to the heating boiler, a check valve being installed to prevent the water from flowing back through the pump. When the weight of the tank has been reduced sufficiently to permit it to rise, the governor operates to shut down the pump.

Prior to installing this apparatus a steam pump was used, making it necessary to keep up not less than 15 lb. of steam no matter how mild the weather might be. The pump needed also considerable attention from the fireman, whereas the apparatus described above is entirely automatic. In mild weather only from 3 to 5 lb. of steam need be carried.



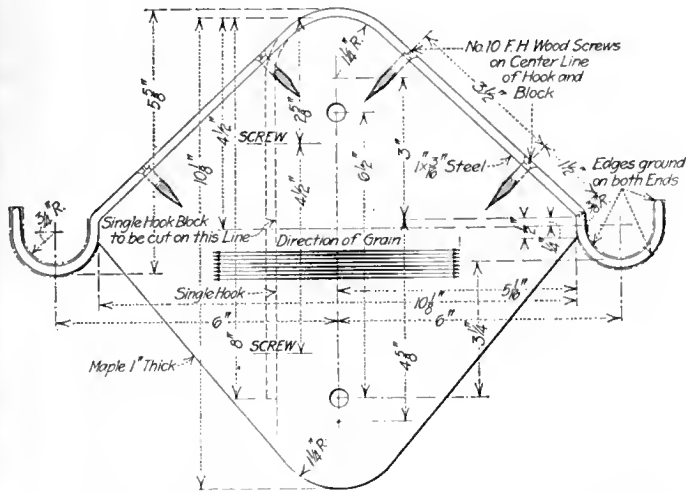


FIG. 3—HOOK BLOCK FOR SUPPORTING STRETCHER

this country, and it will probably be the forerunner of a considerable number of other units of the same kind, for the transportation of wounded men from ships to interior hospitals within a radius of 75 miles from Boston.

Fig. 1 shows the car as completed, with Brigadier-General Johnston standing at the left. One of the most striking features of the arrangement was the small number of changes necessary to adapt the car to hospital transport service. The changes were made under direction of John

Lindall, superintendent of rolling stock and shops, with the co-operation of Col. Thomas F. Sullivan, of the department of maintenance of way, since appointed Commissioner of Public Works, City of Boston. With the slight changes necessary the car has been arranged to carry sixteen reclining patients on the standard medical department stretchers. About thirty patients can be carried in a sitting posture.

The litters are so arranged that there will be eight upper and eight lower berths, the handles being held firmly in place by sockets and straps. The upper litters are supported as indicated in Figs. 1 and 2 between 1 1/2-in. x 1/4-in. leather straps and hook blocks attached to the posts. A detailed drawing of the special block used to carry the hooks is shown in Fig. 3. The straps are hung from 1-in. x 3-in. sills carried through the car on each side as indicated in Fig. 4, which is a cross-section of the car with two tiers of litters in place. The hooks are of 1-in. x 3/16-in. steel strap, screwed to the blocks as shown, a single-hook type of block being used at the four end posts of the car. The litter handles seat in the

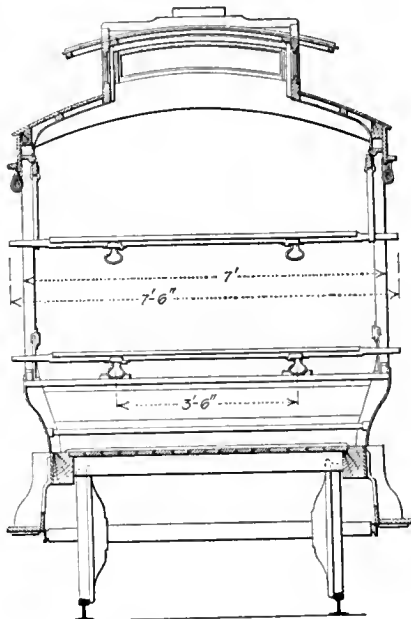


FIG. 4—CROSS-SECTION OF AMBULANCE CAR, BOSTON ELEVATED RAILWAY

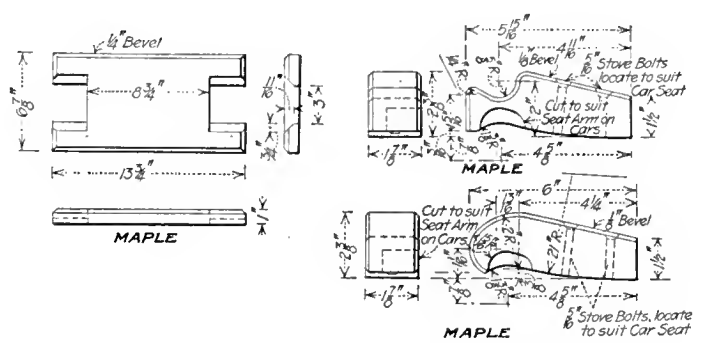


FIG. 5—SEAT BLOCKS FOR SUPPORTING STRETCHERS

straps and hooks in such a way as to preclude the danger of withdrawal through swaying. The lower tier of litters is carried on special seat blocks, Fig. 5, of maple, screwed into the seats and arranged to furnish a close and safe fit, securing the litters in place at their pedestals.

The car has been painted in white enamel, with appropriate Red Cross insignia on the sides and ends. White curtains are arranged to permit drawing when it is desirable for the comfort and welfare of the patients. A first-aid food and supply box is carried on one end of the car, and provision is made for carrying a 5-gal. water bottle overhead. One of the chief advantages of the car is that the patients may be attended from either end while in transit and on either side as well, besides offering the benefits of fresh air en route.

### Tokyo to Have Rapid Transit Soon

ON ACCOUNT of the great congestion in the streets of Tokyo, Japan, and the urgent demand for better transportation facilities, plans have been completed for the immediate construction of a subway system, 9 1/2 miles long. This will be built in a fairly straight line under the busiest part of the city. The construction work is to be of reinforced concrete throughout, with a track gage of 4 ft. 6 in., which is widely used in Japan. The third-rail system is to be employed.

The sum of 21,000,000 yen has been decided upon as necessary for the project, or at the rate of 2,210,000 yen per mile (1 yen = 50 cents). High-speed service, at five-minute headway will be given between 5 a.m. and 1 a.m. No cars will be operated from 1 to 5 a.m. The fare is to be 5 sen (2 1/2 cents) and the estimated net profits are given at \$970,000, with a guaranteed dividend of 8 per cent to the promoters. Substantial business men throughout Japan are backing the project and it is understood that work is to begin at once.

In comparing the estimated cost of this project with that of similar undertakings elsewhere the purchasing power of the yen in Japan must be considered. This is not far inferior to the value of the dollar in the United States. Labor is, of course, far cheaper than in this country and only a small proportion of the total amount mentioned represents labor cost.

The United States Fuel Administration has issued a warning against the use of anthracite where bituminous coal should be used. In the opinion of the administration such use is not fair to the domestic consumers of those communities that are to receive certain allotted tonnages.

## Repair Shop Statistics Published

Data Just Issued by United States Census Bureau Give Interesting Information

THE census of manufacturers for 1914, just issued by the Census Bureau, gives some interesting facts about electric railway repair shops. The general statistics are given in Table I. In the following tables the term "establishment" is used to indicate all the shops and maintenance plants "under a common ownership or for which one set of books of account are kept." Table II shows the classification of the workers. Of the total number 99.3 per cent were males and 0.7 per cent were females. Statistics of the average number of employees by months showed that the fluctuation caused by seasons is very small indeed.

Table III gives the prevailing hours of labor per week and shows a tendency toward a shorter working day in the two years mentioned.

In 1914 61 per cent of the wage earners were employed in establishments where the prevailing hours were less than sixty per week, as compared with 47 per cent in 1909. A decrease is also shown in the proportion employed in establishments operated sixty hours per week, from 35 per cent in 1909 to 22.9 per cent in 1914.

Table IV gives the size of the establishments in 1914 and in 1909, as measured by the number of wage earners employed in the industry. As shown, the groups hold very nearly the same relative position in the two years. Table V gives the detail statistics of the work performed in the three years.

TABLE I—STATISTICS OF ELECTRIC RAILWAY REPAIR SHOPS

	Number or Amount				Per Cent of Increase		
	1914	1909	1904	1899	1909-1914	1904-1909	1899-1904
Number of establishments.....	649	541	86	108	20.0	529.1	20.4
Persons engaged.....	28,215	23,699	11,551	7,226	19.1	105.2	59.9
Proprietors and firm members.....	4	.....	.....	.....	.....	.....	.....
Salaried employees.....	1,827	1,281	499	201	42.6	156.7	148.3
Wage earners (average number).....	26,384	22,418	11,052	7,025	17.7	102.8	57.3
Primary horsepower.....	44,989	35,794	3,154	6,443	25.7	1,034.9	51.0
Capital.....	\$63,613,741	\$38,898,686	\$12,905,853	\$10,781,939	63.5	201.4	19.7
Salaries and wages.....	20,559,383	15,690,228	7,555,485	4,598,268	31.0	107.7	64.3
Salaries.....	1,914,538	1,204,219	542,687	193,675	59.0	121.9	180.2
Wages.....	18,644,845	14,486,009	7,012,798	4,404,593	28.7	106.6	59.2
Paid for contract work.....	24,596	23,480	13,195	23,392	4.8	77.9	43.6
Rent and taxes (including internal revenue).....	581,657	351,626	119,598	136,193	65.4	.....	12.2
Cost of materials.....	17,609,574	15,167,899	5,463,360	4,336,744	16.1	177.6	26.0
Value of products.....	38,576,565	31,962,561	13,437,121	9,370,811	20.7	137.9	43.4
Value added by manufacture (value of products less cost of materials).....	20,966,991	16,794,662	7,973,761	5,034,067	24.8	110.6	58.4

TABLE II—NUMBER OF PERSONS ENGAGED IN THE INDUSTRY

	1914	1909
All classes.....	28,215	23,699
Proprietors and officials.....	803	658
Proprietors and firm members.....	4	.....
Salaried officials of corporations.....	101	107
Superintendents and managers.....	698	551
Clerks and other subordinate salaried employees.....	1,028	623
Wage earners (average number).....	26,384	22,418
Sixteen years of age and over.....	26,377	22,403
Under sixteen years of age.....	7	15

TABLE V—CLASS OF WORK DONE FOR EACH DEPARTMENT

Class of Work	1914	1909	1904
Total value.....	\$38,576,565	\$31,962,561	\$13,437,121
Motive power and machinery department, value.....	\$5,380,573	\$4,510,332	\$510,946
Repairs to motors, etc.....	\$4,933,436	\$4,004,336	.....
Work for other corporations.....	\$56,944	\$88,070	\$2,626
All other products or work.....	\$390,193	\$417,926	\$508,320
Car department, value.....	\$31,086,043	\$25,835,463	\$12,581,365
Cars built, value.....	\$811,104	\$626,752	\$605,144
Passenger—			
Number.....	235	129	288
Value.....	\$737,926	\$498,709	\$580,669
Freight—			
Number.....	11	63	13
Value.....	\$21,196	\$59,102	\$11,366
Other—			
Number.....	58	51	9
Value.....	\$51,982	\$68,941	\$13,109
Repairs to cars of all kinds	\$27,628,802	\$22,869,777	\$11,254,505
Work for other corporations.....	\$441,323	\$624,805	\$36,714
All other products or work.....	\$2,204,814	\$1,714,129	\$685,002
Bridge and building department (shopwork), value.....	\$434,427	\$330,948	\$327,855
Repairs and renewals.....	\$199,751	\$273,581	\$253,133
Work for other corporations.....	\$479	\$5,093	.....
All other products or work.....	\$234,197	\$52,274	\$74,722
All other products and work, not classified, value.....	\$1,675,522	\$1,285,818	\$16,955

<sup>1</sup>Includes the value of one electric locomotive.

<sup>2</sup>Includes the value of three electric locomotives.

TABLE III—PREVAILING HOURS OF LABOR

Prevailing Hours of Labor per Week	Wage Earners in Establishments with Specified Number of Hours			
	Average Number		Per Cent of Total	
	1914	1909	1914	1909
Total.....	26,384	22,418	100.0	100.0
Forty-eight and under.....	1,665	220	6.3	1.0
Between forty-eight and fifty-four.....	1,638	510	6.2	2.3
Fifty-four.....	6,160	4,803	23.3	21.4
Between fifty-four and sixty.....	6,640	4,992	25.2	22.3
Sixty.....	6,040	7,845	22.9	35.0
Between sixty and seventy-two.....	3,857	3,689	14.6	16.5
Seventy-two.....	23	74	0.1	0.3
Over seventy-two.....	361	285	1.4	1.3

TABLE IV—CLASSIFICATION OF SHOPS ACCORDING TO NUMBER OF WAGE EARNERS

Wage Earners Per Establishment	Number or Establishments				Average Number of Wage Earners			
	Per Cent of Total		Per Cent of Total		Per Cent of Total		Per Cent of Total	
	1914	1909	1914	1909	1914	1909	1914	1909
All establishments.....	649	541	100.0	100.0	26,384	22,418	100.0	100.0
No wage earners.....	.....	2	.....	0.4	.....	.....	.....	.....
One to five wage earners.....	253	205	39.0	37.9	7,719	6,115	2.7	2.7
Six to twenty wage earners.....	193	169	29.7	31.2	2,134	2,000	8.1	8.9
Twenty-one to fifty wage earners.....	112	87	17.3	16.1	3,537	2,813	13.4	12.5
Fifty-one to 100 wage earners.....	37	31	5.7	5.7	2,623	2,400	9.9	10.7
101 to 250 wage earners.....	34	30	5.2	5.5	4,862	4,619	18.4	20.6
251 to 500 wage earners.....	9	8	1.4	1.5	3,366	2,688	12.8	12.0
501 to 1000 wage earners.....	8	6	1.2	1.1	5,265	3,661	20.0	16.3
Over 1000 wage earners.....	3	3	0.5	0.6	3,878	3,622	14.7	16.2



Of the work done in 1914, 13.9 per cent was for the motive power and machinery department; 80.6 per cent for the car department; 1.1 per cent for the bridge and building department; and 4.3 per cent for all other work, not classified. Repairs to motors constituted 91.7 per cent of the work in the motive power department, and repairs to cars constituted 88.9 per cent of the car department expense. The number of cars constructed shows a slight decrease in 1914, as compared with 1904, but the value of cars built shows an increase for the same period of 34 per cent.

## One-Man Cars of Economical Design

### Bodies Built at Rome, Ga., Weigh 8000 lb., Have Seating Capacity of Twenty-eight and Cost \$1,350 Each

BY A. WADE

Master Mechanic Rome Railway & Light Company, Rome, Ga.

THE Rome (Ga.) Railway & Light Company has recently built in its shops four one-man cars. These cars are 20 ft. 8 in. over corner posts, 31 ft. over bumpers and 8 ft. 2 in. over belt rail with a seating ca-

sills through angles forged from  $\frac{1}{2}$ -in. x 6-in. x 3-ft. plate.

The side posts are 3 in. x  $3\frac{1}{2}$  in., of hard pine, cut away under the windows  $\frac{1}{2}$  in. to receive the siding, which is made up of three  $1\frac{1}{8}$ -in. x 12-in. hard pine boards, the full length of the car, tongued and grooved and glued together. Each of the three side boards has two  $\frac{3}{8}$ -in. through bolts at each side post and is dressed and stained cherry on the inside of the car, providing the finish under the windows.

The exterior of the car is covered with No. 16 sheet steel 36 in. wide continuous from corner post to opposite-end vestibule post. The dashes are one-piece No. 16 sheet steel. The letterboard is No. 14 sheet steel, 8 in. broad and riveted in continuous length entirely around the car and vestibules over the windows. A  $1\frac{1}{4}$ -in. x 3-in. plate extends from the door to the opposite end vestibule post and is secured to each side post by the  $\frac{3}{8}$ -in. through bolts in the siding and a  $\frac{3}{8}$ -in. x 5-in. plate is continuous around the car and bolted to the side and end sills. Eight  $\frac{5}{8}$ -in. tie rods pass from side to side under the floor. The floor is double from the trapdoors to the wall and is made of full length rift



MODERATE-COST ONE-MAN CAR BUILT IN GEORGIA—INTERIOR ARRANGEMENT OF GEORGIA ONE-MAN CAR

capacity of twenty-eight. Hand-operated folding doors and steps are provided, the operating lever being placed at the left of the controller equipment.

The interior trim of the car is birch, stained cherry color to match the Heywood Brothers & Wakefield seats, and the headlining is Agasote painted green. Pantasote curtains and metal sash are used, the side sash being arranged to raise while the front vestibule sash drops in straight grooves and rests when closed on the pocket cover, making a leak-proof sash. Adams & Westlake No. 10 push-buttons with porcelain centers are used.

The truck sills are 3 in. x 9 in., of long-leaf yellow pine reinforced by 3-in. x 5-in. x  $\frac{3}{8}$ -in. angles full length. The side sills are of 3-in. x 5-in. pine and the cross sills of 4-in. x 4-in. white oak. The end sills are 4-in. x 8-in. oak, bolted to all four of the longitudinal

pine tongued and grooved and screwed to the cross sills.

The car bodies complete weigh 8000 lb. and cost \$1,350 each. The raw material for these cars was bought in the early months of 1917.

## Lubricants for Anti-Friction Bearings

Roller and ball bearings require lubricants especially designed, as the nature of the duty upon the lubricant is different from that in sleeve bearings. The oil manufacturers must be looked to as the source of information in this field. As a result of a careful analysis of the needs of anti-friction bearings the Galena-Signal Oil Company has compounded a special oil and a grease to meet the preferences of the roller and ball bearing manufacturers. The former is known as "ball-bearing oil" and the latter as "ball-bearing grease No. 1."

## Improvements in the Power-Saving Recorder

THE Arthur "Power saving recorder," described in the issue of the *ELECTRIC RAILWAY JOURNAL* for April 28, 1917, has recently been improved by the addition of a dial to indicate in minutes the "power on" time. This takes the place of the dial formerly used to register braking time, the lower dial giving a record of the number of brake applications, is still retained.

The "power on" dial is operated by means of an internal clock mechanism which is started by an electromagnet each time power is applied. The mechanism continues to run until the power is shut off and the magnet is deenergized. The coil of the electromagnet which starts and stops the clock is connected in series with one of the motors of the car on the ground side. No switches or fuses are used since the car control equipment provides the necessary safeguard, and there is no potential at the recorder that can give a shock to the crew or passengers. The electrical and air connections necessary are shown in an accompanying illustration.

The lower dial is connected to and is controlled by the

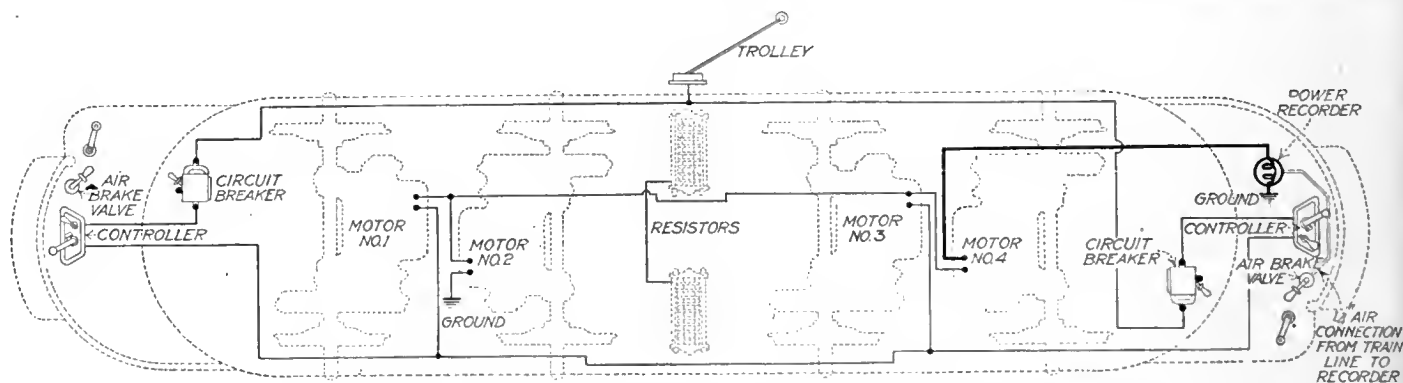
heavier than the rest, leading from the ground side of No. 4 motor to the recorder, and a short length of  $\frac{1}{4}$ -in. iron pipe between the recorder and the train line. The latter connection is usually made immediately under the brake valve, much in the same way that the pressure gage is connected.

## Built-Up Sections of Track for Diverting Traffic

BY W. L. WHITLOCK

Office Engineer Denver (Col.) Tramway

IN preparation for the reconstruction of a number of heavy special-work layouts in the business district of Denver, the tramway engineering department had constructed at the storage yard a number of sections of temporary track which were rather unusual and with which it proved possible to construct very quickly a new path for the cars at the sides of the street. This construction was decided upon after a conference had determined that it was impracticable to reroute the cars to avoid the section at which the layouts were be-



CONNECTIONS NECESSARY FOR INSTALLING THE POWER RECORDER

brake. It records the number of stops and slow-downs made, that is, the actual number of brake applications.

All operating parts are inclosed in a small steel case which is preferably installed in front of the motorman just above the controller.

Among the advantages claimed for this device are the following: (1) It checks the motorman in his operation of both the controller and brakes and in addition emphasizes the safety features of operation. (2) It puts a premium upon his shutting off the power sooner and running with power shut off, or coasting, for as long as possible, this being the safe and economical way to operate a trolley car. (3) It also checks running at unnecessarily high speeds, since to produce these speeds requires that the power be kept on longer. (4) It checks "fanning of the air," and the making of unnecessary stops and slowdowns. (5) It also improves the spacing of cars, as a motorman soon finds that operation too close to the car ahead requires frequent and unnecessary applications of the brakes, and a consequent longer power-on period. (6) The record is in positive terms that a motorman can understand. (7) The mechanism is inherently simple, consequently the cost of the device and its maintenance is low; its installation cost is also low.

It will be seen from the diagram that it is necessary in installing the apparatus to run but one wire, shown

ing installed, or to make the change in special work during the hours of the night. The necessity for allowing a certain time for concrete to set also influenced this procedure.

The track construction adopted consisted of 30-ft. sections of 30-lb. T-rail, which were held at the proper gage by means of  $\frac{3}{4}$ -in. x 4-in. x 7-ft. pieces of old guard rail welded to the bases of the rails and spaced approximately 4 ft. apart. The rails and cross-ties were welded at the four edges coming in contact by two men using an Indianapolis arc welder. To do this work, the T-rails were set, bottom side up, on ties and held to gage by stakes, and the rail and tie were clamped together during the welding process. Connection from this straight temporary track to the permanent track was made by means of two standard temporary cross-overs made of "bull" rail and T-rail, which were joined by a compromise joint shown in one of the illustrations. Rivets through the ball of the "bull" rail and the plate which was welded onto the end of the T-rail served to form the union, since bolting was impossible.

At the time of the rebuilding of the special work at Fifteenth and Curtis Streets, described in the *ELECTRIC RAILWAY JOURNAL* for Feb. 23, page 375, this type of "shoo-fly" track was given a thorough tryout. A 300-ft. stretch of it was laid along each side of the street by means of a 3-ton crane car. The sections were

laid and bolted together and operation begun over the track in the short time of three hours.

When this track was first installed, the outside rail was blocked up with wooden wedges to compensate for the crown of the street, but after traffic was in full operation over the track it was found almost impossible to keep the wedges in place and the track was thereafter allowed to rest directly on asphalt pavement. As a result one side of the track was somewhat lower than the other, but this did not seem to disturb the regular operation of the cars. The "shoo-fly" track did not begin to move under traffic until the second day, when the trainmen, having become familiar with the operating conditions, began to operate their cars at more nearly normal speed. No attempt was made to stop the movement of the track until it would find its natural resting place and stop. But the asphalt paving offered little resistance, and it became necessary to hold the track in place. For this purpose a heavy log chain was attached to the turnout end of the "shoo-fly" and fastened to a tie in the permanent track. The chain held satisfactorily, but had to be removed later when it was found out that the strain pulled the rails of the turnouts apart. It was then attempted to hold the track by spiking the cross-pieces to the pavement, but the vertical and lateral motion of the track under service caused the spikes to be either pulled out or bent over.

The scheme of chaining the cross-pieces rather than the

second night. This operation usually required about one hour with the help of two work cars and was considered the easiest thing to do under the circumstances.

The "shoo-fly" track construction, made of 30-lb. rail approximately twenty-seven years old, held up under very heavy traffic for three weeks, with a total of fifty

breaks in the rail. Fortunately all these breaks occurred in straight rail, and in each case angle bars were put on by men detailed to watch the track. The rails usually broke under the front truck of a car, and in three cases derailment followed, tying up traffic for a maximum of twenty minutes. In one instance a motorman gave his airbrakes an emergency application to prevent hitting a person and the wheels gripped the rails so firmly that the momentum of the car pulled the "shoo-fly" track apart, breaking both

rails. The portion on which the car was running separated from the rest approximately 18 in.

After completion of the construction work the "shoo-fly" track was removed by means of the crane car in approximately the same time that it was laid. The conclusions reached from our experience with this track construction is as follows:

The idea is all right and worked out reasonably well in practice; the electric arc welding for assembling the track at the storage yard is successful; the use of heavier rail and the spacing of cross-pieces 3 ft. apart instead of 4 ft. is necessary, and, finally, the lateral movement of the entire track can be



TEMPORARY TRACK ALONG EACH SIDE OF STREET UNDER CONSTRUCTION, DENVER TRAMWAY

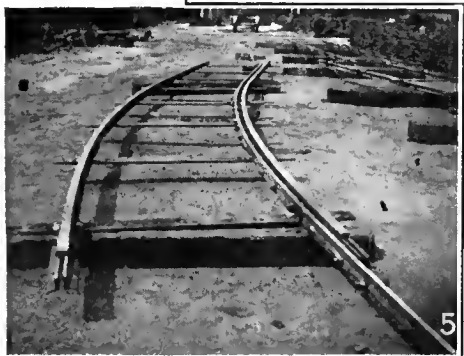
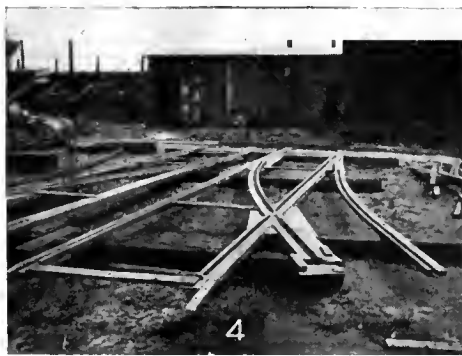
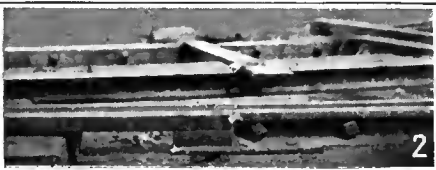


FIG. 1—CROSS-TIE PLATE WELDED TO RAIL BASE. FIG. 2—COMPROMISE JOINT BETWEEN "BULL" RAIL AND LIGHT T-RAIL. FIG. 3—"SHOO-FLY" TRACK SECTIONS MADE UP AT STORAGE YARD. FIG. 4—HALF OF SECTION OF "BULL" RAIL CROSSOVER. FIG. 5—CURVE CONNECTION WITH GUARD BOLTED TO RAIL

rail itself was considered, but owing to the uncertainty of the firmness of the weld between the cross-pieces and the rails, it was thought best not to risk breaking them and spreading the rails, thereby causing a derailment. The final plan of taking care of this situation was simply to allow the track to assume its own path and draw it back to the original position every

overcome by means of heavier construction. Considering the construction as a whole it proved very satisfactory and by assembling the various sections at the yard as previously described a temporary route was made available for operating the cars in a very short time. This method also did away with the necessity for making changes during the night.

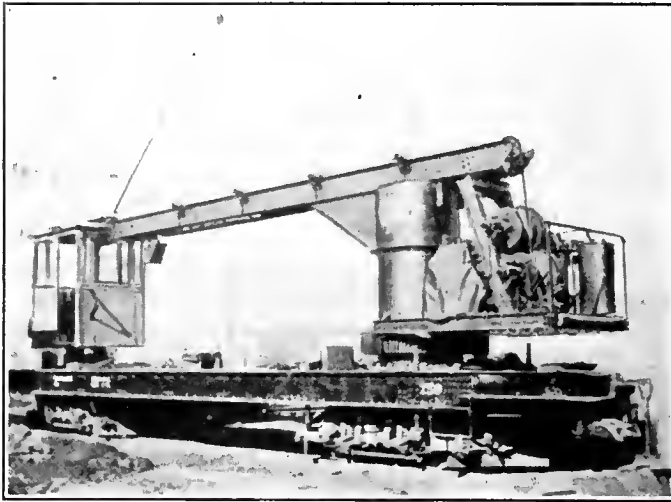


FIG. 1—HOME-MADE MOTOR-OPERATED 3-TON CRANE EQUIPMENT

## Crane Car Built in Denver Shops

BY W. H. McALONEY

Formerly Superintendent of Rolling Stock, Denver (Col.) Railway

THE Denver Tramway has recently turned out in its shop a new steel-body crane car for the use of the engineering department in handling heavy materials. The car operates very successfully, and is proving to be a big labor saver. It was recently used to advantage in handling sections of special work and temporary track made up ready for use during replacement of the special work layout at one of the downtown crossings. This construction work was described in an article which appeared in the *ELECTRIC RAILWAY JOURNAL* for Feb. 23, 1918, page 375.

The car is 40 ft. long over all, 8 ft. wide, and weighs complete 53,000 lb., the frame being made up of 15-in., 33-lb. steel channels. It is equipped with two Brill 27-E trucks and four GE-58, 37½-hp. motors operated with a K-6 controller and auxiliary contactors. Tomlinson A1-2 couplers and Westinghouse semi-automatic air brakes are used. The car-operating cab is 15 in. above the floor, and is placed on three vertical supports made of 3-in. x 5-in. angles reinforced by substantial ¼-in. gusset plates. The angles go down through the floor and are fastened to the center beams



FIG. 2—DENVER TRAMWAY CRANE CAR HANDLING HEAVY SPECIAL WORK

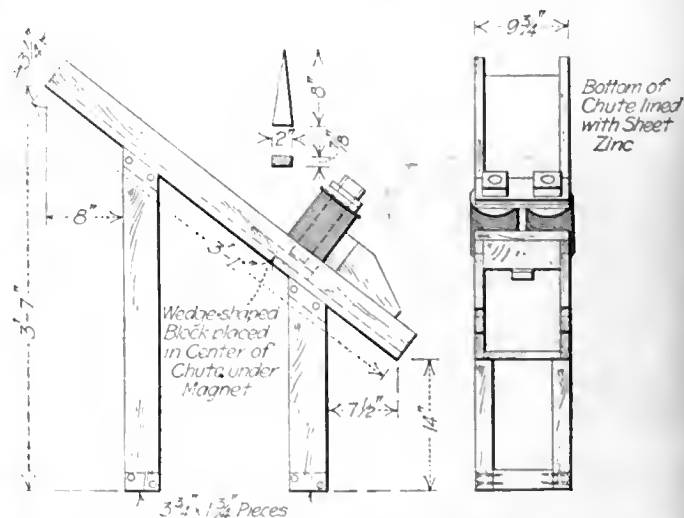
of the car. The cab has a receptacle on both front and back for a Golden Glow searchlight with a 94-watt lamp on main and dimmer resistance.

The steel jib crane was built by a local iron works, and has a capacity of 3 tons and a reach of 21 ft. The revolving cylinder or drum is made of ¼-in. steel boiler plate, strengthened by angles and braces fastened to the crane beam, as shown in Fig. 1. The crane beam is 26 ft. 2 in. long, with the revolving axis 4 ft. 8 in. from one end, and stands 7 ft. 4 in. above the car floor. It is made up of four 12-in. channels arranged in pairs, back to back, the carriage running on the bottom flanges of the inside channels, which are faced with ⅜-in. steel strips. The top of the beam is strengthened by two ¼-in. plates for one-half its length and the balance laced by ¼-in. x 2-in. steel jibs, and in addition five ¼-in. x 3-in. angles are placed back to back across the top.

The crane is motor-operated, the platform being supported at the base of the drum by two 6-in. channels on the outside, and two beams of the same size channel placed back to back lengthwise in the center of the platform and cross braced with angles. The floor of the platform is made of ¼-in. steel plate. The distance from the bottom of the crane-motor platform to the car floor is 17 in. The motor, which is a 10-hp. Otis Elevator, compound-wound, direct-current machine, handled by an old K-10 controller, is placed in a horizontal position, and power is transmitted through bevel gears to a vertical shaft with a pinion which engages a large band gear encircling the lower part of the drum.

## Magnetic Separator for Shop Use

For the benefit of the readers of the *ELECTRIC RAILWAY JOURNAL* who might like to duplicate the magnetic separator, described in the issue for Feb. 23, 1918, page 377, used in the New York Railways shops, Syracuse,

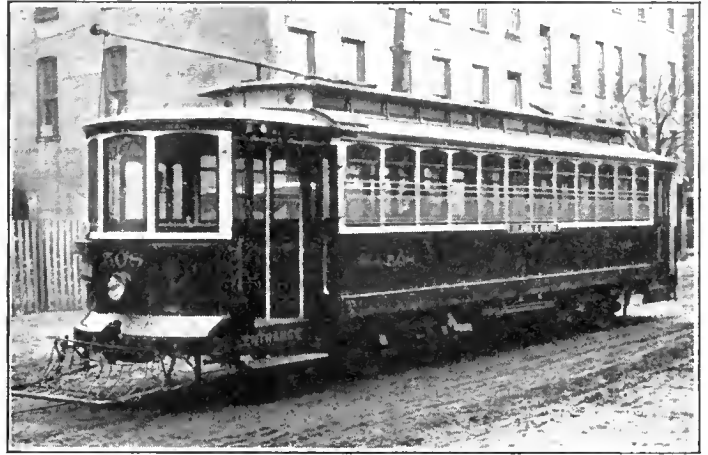
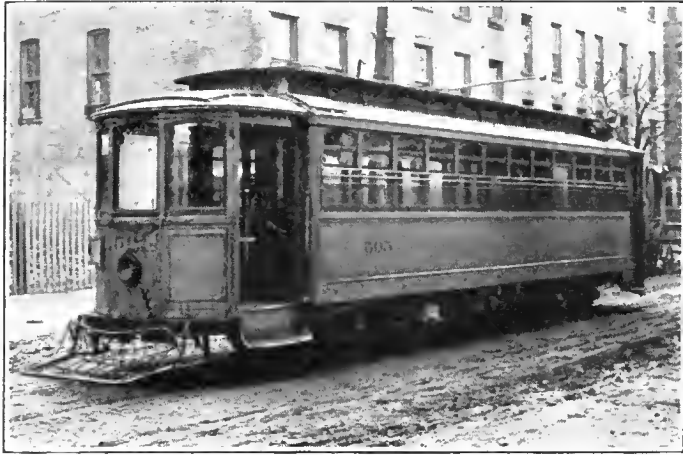


MAGNETIC SEPARATOR FOR USE IN SEPARATING SCREWS AND FILINGS

N. Y., F. L. Hinman, master mechanic, was asked to make up a dimension drawing of the device. He has done so and the drawing is reproduced herewith.

For convenience in construction standard contactor coils can be used in making the separator, as was done at Syracuse.





EXTERIOR OF ROCHESTER CITY CAR BEFORE AND AFTER REMODELING

## \$55,000 Car Remodeling Job at Rochester

**Total of More Than 150 Cars Now Going Through New York State Railways Shop**

SINCE last April more than 100 cars of the local city and interurban lines of the New York State Railways, Rochester lines, have been put through the shops for remodeling work varying in cost from \$325 to \$500 per car. This has been done without any interference with the shop routine and in spite of severe labor shortage. At the present rate the entire schedule calling for about 150 cars will be completed this spring. These attractive remodeled cars, with the fifty "Pete-Witt" cars now in operation, will put the company on "easy street" for the time being as far as rolling stock is concerned. This remodeling has recently been the basis of very favorable comment by the Rochester Chamber of Commerce in its weekly bulletin. The work was planned and is being supervised by J. F. Uffert, who came to the company from Albany last spring.

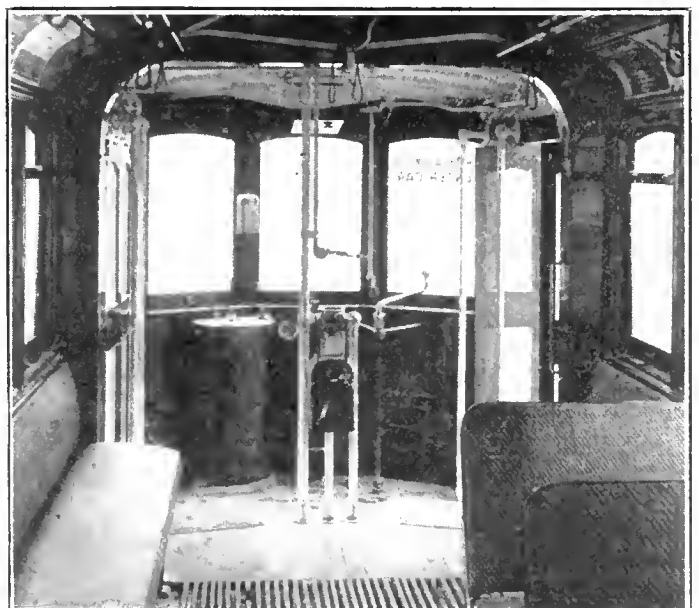
The job comprises changes in forty-one double-end city cars which are being fitted up for pay-as-you-enter operation, 100 single-end cars being similarly equipped, and a number of interurban cars, four of which have

already been completed. After completion of repairs all cars are being painted the new standard colors of the New York State Railways, a light green with cream trimmings.

### WORK ON THE DOUBLE-ENDERS

The first step in the double-end car work is the lengthening of the platforms by 16 in., giving a total length of about 6½ ft. Then the bulkheads are replaced with arches as in new cars, and folding doors and steps are installed on both sides of each platform. For the manipulation of the entrance doors and steps a vertical rotating rod is provided in a central location at each end. The motion of this is transmitted by a simple crank and rod mechanism to the door and step rods. A detachable handle completes the equipment. The exit door and step have a similar but simpler mechanism operated also by means of a detachable handle.

For the conductor the floor is carried out about 6 in. beyond the end sill somewhat in accordance with the Montreal plan, in order to provide the maximum loading space and a good view of the platform, and so to place the conductor that he will not be in the way of entering or alighting passengers. (See photograph of Montreal car, page 402 of the issue of this paper for March 2, 1918.)



FRONT END INTERIOR OF ROCHESTER CITY CAR BEFORE AND AFTER REMODELING



In addition to the larger changes the installation of Consolidated door buzzers, Edwards sash locks on the motormen's windows, etc., serve to render the cars convenient to operate. The cost of this work, including painting, was about \$500 per car.

The single-end car improvements are of the same general character as those described, except that the rear platform is being lengthened but 12 in. A number of these cars were too high for certain parts of the railway system, and the roofs of these are being lowered by eliminating the monitor deck. These single-end cars are in general heated with stoves, and as a convenience to the conductors coal boxes have been built under a section of the longitudinal seats to the left of the stoves. Access to the box is had by raising a 3-ft. section of the seat. In ten of the cars new Peter Smith hot-air heaters are being installed. About sixty out of 100 of these cars are already completed at a cost of about \$325 each.

Several important changes are being made in the interurban cars, including painting to match the city cars as a general advertising feature. In the first place the bulkheads are being pushed forward 3 ft., giving room for two additional cross seats accommodating four passengers in the front or smoking compartment. Minor changes in the seating arrangement have permitted installing one other additional seat so that the seating capacity has been raised from fifty to fifty-six.

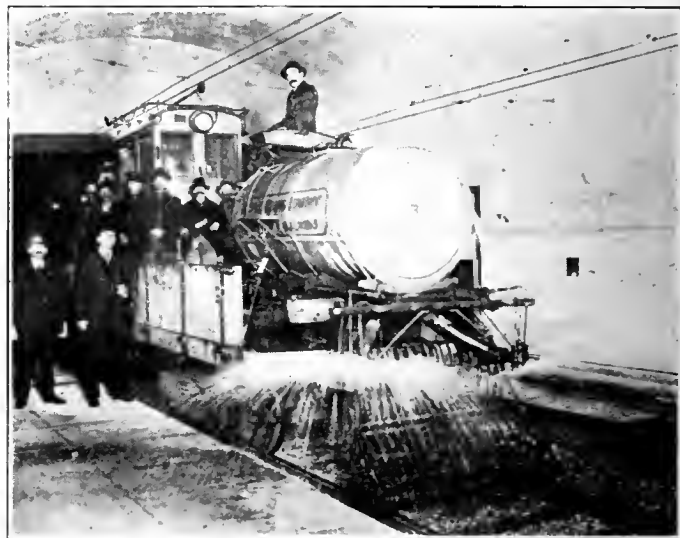
Formerly there were solid panels between the front vestibule and the car. These have been replaced with glazed panels so as to give a good view forward. All seats have been arranged to face forward for the maximum convenience of passengers, and all have been equipped with arm rests. These rests are not only a comfort to the passengers but they also preserve the full width of the aisle. Sliding doors are being placed in the partitions between smoking compartments and main sections as these close more positively than swinging doors.

The reduction in size of the front platform, of course, necessitated putting the hot water heaters elsewhere in the cars. Therefore, metal-lined compartments have been built forward of the toilet rooms in the rear of the cars, the heaters being entirely inclosed. Screens are provided at the top and bottom of the doors to provide necessary circulation of air.

### Sprinkler Improvised to Wash Ballast in Tunnel

WHEN the Twin Peaks Tunnel in San Francisco was recently opened for regular service it was necessary either to oil the roadbed or to find some other means of laying the heavy deposit of fine dust which had gathered in the crushed rock ballast. The accompanying illustration shows the equipment with which the roadbed in the tunnel was freed from dust at almost negligible expense.

The tank of an 800-gal. street sprinkler owned by the city street cleaning department was taken from its running gear and mounted on a work car. The tank was blocked up and fastened in position with a cable to prevent shifting while in service. The sprinkler had two outlets so that a throw of 15 ft. each way was secured by



ROAD SPRINKLER PLACED ON WORK CAR TO LAY DUST IN TUNNELS

gravity, the flow being controlled in the ordinary manner from the driver's seat.

This equipment was used in the tunnel for three consecutive days, operating on both tracks. The roadbed was thereby given a soaking rather than a sprinkling, as the repeated trips over the 12,000-ft. length of the tunnel were sufficient thoroughly to wash the ballast and the base of the walls. It is believed that the treatment will not need to be repeated for many months, if at all.

### Convenient Sand Storage for Car Service

AT THE Hooker Street carhouse of the Springfield (Mass.) Street Railway sand is conveniently stored, for immediate service on the cars, in barrels mounted at the side of the yard, as shown in the accompanying illustration. Each barrel is fastened to a set of four short sections of discarded ties braced against four wooden uprights driven about 18 in. into the ground.

Iron straps are used to fasten the barrels and ties together and covers are provided as shown. Each side of the yard is equipped with about a dozen barrels which are filled at night from a sand car run along the outer yard track. With a minimum disturbance to car movements individual cars can be supplied with sand during the day from the barrels instead of being obliged to move into the carhouse.



BARRELS FOR DAILY STORAGE OF SAND

## LETTERS TO THE EDITOR

### To Zone or Not to Zone

NEW YORK CITY, APRIL 10, 1918.

To the Editors:

I was glad to see from your issue of April 6 that the Massachusetts Public Service Commission has approved the establishment of a zone system in Springfield. The basic principle of the zone fare idea is that people should pay in accordance with what they get, and that is assuredly not the case in American street railroading. When visitors to a spa are allowed to drink for a nickel as much water as they want, they naturally assume that the cost of production is next to *nil*. Similarly, could the American public be blamed for assuming that transportation production costs next to nothing when it could get for a single nickel all the transportation that it wanted? Worse than this, the railway operator himself had no incentive to determine the cost of service in proportion to distance. Confronted at last by the *debacle* of the nickel fare, his first impulse is to seek relief via the seeming short cut of an increased flat fare rather than to take the longer, harder but surer road of determining the proper charge for different amounts of service. Yet even if the increased flat fare does bring in the needed revenue, the public is still encouraged to assume that it costs no more to be carried 10 miles than 1 mile.

Of course, I do not mean to say that the zone fare unadulterated is the universal solution. Each road will have to work out its own salvation, but it must first show willingness to be saved! Perhaps the least favorable place to consider a zone fare is in a city where short-haul riding in the business section has been discouraged by placing the surface cars underground. Since the great majority of riders are in the long-haul class, an increase in the flat fare should produce a practically proportionate increase in revenue. Yet even here, there may be an opportunity to build up profitable short-haul riding within the limits of the suburban towns.

A completely opposite case is presented by railway system "A" which is made up principally of small city properties. Although a neighboring railway, "B," of like characteristics has had success with zone fares, system "A" prefers an increased flat fare. The many short-haul riders of system "A" are dissatisfied and have begun to ask themselves why they should be taxed for the benefit of the long-haul rider. Is it logical for the railway to discourage the patronage of the profitable 5-cent customer who can walk, while failing to charge a sufficient increase for the suburbanite whose ride is so long that he won't walk? The suburban dweller's complaint that he moved far out because the fare was 5 cents, is hardly the concern of the railway. He might object equally well to paying higher taxes because taxes were low when he first became a resident of Lionel Terrace.

Finally, in your issue of Jan. 5, Peter Witt mentioned conditions where it might even be feasible to begin the zone fare at something below 5 cents, namely, in busy streets where many people might be encouraged

to ride for a mile or less. This possibility will yet have to be considered in cities where extensive subway-elevated systems denude the surface lines of all long riding. In such cases, a higher unit fare for surface cars or a charge for a transfer will simply drive more people to the high-speed lines and increase the demand for through routing with its frequent waste of car mileage. What is wanted is a rate of fare and a frequency of service that will make long walks a rarity. London's zone fares have proved that this can be done, so why not the same plan in America?

E. B. M.

### Limitations in Track Spiral Standardization

KANSAS CITY RAILWAYS COMPANY

KANSAS CITY, Mo., April 12, 1918

To the Editors:

Relative to the editorial in the *ELECTRIC RAILWAY JOURNAL* of April 6, and the article in the same number concerning track spirals and their standardization, please note the following points:

The principles which Mr. Ryder has used in working out formulas for the proposed standard spirals are undoubtedly correct, and to my mind the formulas are the best and most convenient for use in arriving at the ends sought. It would undoubtedly be desirable if all companies and manufacturers figured work of this kind in a uniform way, and if some such system of spirals is adopted this end would ultimately be accomplished, although it might take many years.

From an operating standpoint there is practically nothing to be gained by such standardization. A spiral is a spiral, and the changes sought are only those that apply to computation of such curves and their representation upon the drawings. There is little difference in the actual alignment of the track, finished to conform to various spirals. There is, therefore, no practical benefit to be derived from this change, from an operating standpoint. From the standpoint of economy it is a question whether anything will be accomplished by this move. I doubt if any concern engaged in the manufacture of special work would change its price by 1 cent because the curves are figured by some new formula or by the formulas which it has used in its shop as standard.

This change cannot possibly be brought about except through a long term of years. Special-work companies and traction companies have in their files drawings of curves that have been computed from the various formulas in use during past years. These curves will be used and referred to in ordering renewal parts for many years to come. If new formulas should be adopted as standard they would be used only where layouts are renewed in their entirety, or where layouts that did not exist before are installed; otherwise old computations would have to be gone over and the nearest one of the new standard spirals substituted for the old. This, I think, would ordinarily be deemed unnecessary and undesirable. The universal adoption of new spirals would not mean the simplifying of the procedure in drafting rooms of manufacturers, nor of many of the traction companies, as it would increase by one the systems that are now in use rather than decreasing them to a single standard.

It would seem that the farthest the committee could

go in regard to this matter would be to adopt and recommend the computation of spirals in accordance with these formulas, and recommend this as good practice to be substituted, so far as practicable, for other formulas now in use, with a view gradually to eliminate the miscellaneous methods of making such computations.

A. E. HARVEY,  
Superintendent of Way and Structure.

## Section No. 12 Issues Challenge

THE RHODE ISLAND COMPANY

PROVIDENCE, R. I., April 13, 1918.

To the Editors:

We of Rhode Island Company Section No. 12, American Electric Railway Association, are desirous of issuing a challenge. We organized Tuesday evening, April 9, with 204 members. Consequently we have the distinction of claiming to be, in a charter membership, the largest section yet formed and this in the smallest state in the Union.

Not being selfish we desire to challenge some other electric railway company in the United States to beat



COMPANY SECTION NO. 12 ARRIVES AT PROVIDENCE, R. I.

our figures. The nearest approach to our record of 204 was the Public Service Railway Section with 156 charter members.

We will gladly take our hats off to any other company that will beat us, but we feel that some lively work must be accomplished before that result can be attained.

The readers of the ELECTRIC RAILWAY JOURNAL will be interested in the accompanying sketch prepared by one of the members of our transportation department.

E. J. COONEY, Executive Assistant.

[NOTE.—Mr. Cooney states that the section members will take off their hats to a successful competitor. The ELECTRIC RAILWAY JOURNAL will supplement this with an appropriate cup as a tangible souvenir of such worthy accomplishment. We hope that a new section will be organized in such force as to furnish the opportunity for presenting this cup soon—Eds.]

A conference of all state fuel administrators from states east of the Mississippi River was held on April 10 and 11 under the auspices of the United States Fuel Administration. It was called to discuss general conservation, including the skip-stop system of electric railway operation among other details.

## AMERICAN ASSOCIATION NEWS

### Special Joint Committee of A.S.T.M. and A.E.R.E.A.

THE American Society for Testing Materials and the Engineering Association have appointed representatives on a joint committee to consider the possibility of substituting the Brinell hardness test for the drop test of girder rails. The reason for the appointment of this committee is clearly set forth in the following excerpt from the minutes of the recent meeting of committee A-1 of the A. S. T. M., which has been furnished by the secretary of that committee:

The sub-committee called attention to the difficulty of making drop tests on girder rails, owing to the unbalanced and unsymmetrical sections of this type of rail, and pointed out that no question of safety is involved in the test, as the failure of a girder rail in track by breaking is almost unknown. The sub-committee has under consideration the substitution of a Brinell impression test in specifications A2-12 and recommends that the executive committee of the society urge the American Electric Railway Engineering Society to appoint a committee to co-operate with committee A-1 in the consideration of this revision.

In pursuance of this resolution the following representatives have been appointed by the two societies: Charles H. Clark, Cleveland (Ohio) Railway; C. G. Keen, American Railways Company, Philadelphia, Pa.; Martin Schreiber, Public Service Railway, Newark, N. J.; E. F. Kenney, Midvale Steel Company, Philadelphia, Pa.; F. A. Robbins, Jr., Bethlehem Steel Company, Steelton, Pa., and F. N. Speller, National Tube Company, Pittsburgh, Pa.

### Section No. 7 Membership Passes 300 Mark

AS MENTIONED editorially some weeks back the Alast meeting of the Connecticut Company section was the occasion of a "Rhode Island Night" program. Talks were given by the following Rhode Island Company officials: Charles E. Redfern, claim agent; Theodore Francis Green, secretary and trustee; Alonzo Williams, attorney, and E. J. Cooney, executive assistant to the president.

W. R. Dunham, Jr., engineer of maintenance of way, Connecticut Company, a former Rhode Island Company employee, presided at the meeting. Harold Bates, assistant construction engineer, read a paper in which he emphasized the necessity of a continuous inventory and other cost records for the determination of accurate operating data.

In his paper Mr. Bates called attention to the ready availability of data provided by the continuous inventory. The greatest importance, however, lies in its use in connection with the calculation of operating costs. Mr. Bates said that it is essential on any railway property to know not only the total net income, but also the net income from the various revenue-producing divisions and departments. Thus any losses and inefficiencies can be ascertained and properly handled.

An interesting feature of the meeting was the report of the membership committee. This showed that in spite of the difficulties incident to the war fifty-two members had enrolled since the beginning of the year bringing the total membership to 301.

# News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

## Legislature Does Little

Except for War Measures Passed, New York Body Conspicuous for What It Did Not Do

The Legislature of New York adjourned on the evening of April 13. Aside from legislation passed in the interest of the national government as an aid in furthering war preparedness, "no Legislature in the memory of any lawmaker now at the Capitol has achieved so little in the way of constructive legislation."

### WAR MEASURE ENACTED

In deference to demands from the War Department the Legislature passed two bills, introduced by Senator Thompson, of Niagara, permitting the consolidation of the Hydraulic Power Company and the Niagara Power Company to insure more power for the munitions plants established at Niagara Falls and in its vicinity.

Another power measure enacted was that of Senator Thompson providing for the creation of a State hydroelectric commission to recommend a State policy for the development of the latent water powers in the streams of the State.

Among the measures that failed of passage was the bill to provide a 6-cent fare on the electric railways of the State. This bill was designed to bring order out of chaos with respect to the higher-fare cases now pending before the Public Service Commissions of the State and provide immediate relief for the electric railways struggling along under the greatly advanced costs of operation, but with pre-war incomes.

In addition, the Legislature failed to enact legislation fostered by the New York City administration and some of the smaller up-State municipalities to permit the cities of the State to acquire and operate public utilities. A special Senate committee was created to investigate the subject and make recommendations to the next Legislature. The original measure had a very stormy career. Leader Brown put through the Senate a concurrent resolution providing for an appropriation of \$5,000 to defray the expenses of the special Senate committee created to investigate municipal ownership with a view to recommending a fixed policy for the State to the next Legislature. The resolution was sent to the Assembly for concurrence, but came back amended so as to provide for participation by that body in the investigation. Mr. Brown tried in vain to put the resolution through in its amended form, and then directed that it be returned to the House. Speaker Sweet, on further consideration, decided to let the resolu-

tion go through in the Assembly in the form in which it emerged from the Senate, so that, after all, the committee will have the funds necessary for its work.

Senator Ottinger's so-called West Side bill failed. This measure embodied a plan for the adjustment through a commission of the controversy between New York City and the New York Central Railroad in connection with the proposed west side terminal improvement and electrification.

Bills for the relief of contractors on public work demanded by war conditions were passed. Three such measures were sent to the Governor for his approval.

## Whitaker of Baltimore

A True Short Story of Thrift Showing the Employee What Systematic Saving Will Do

Whitaker entered the office of John B. Duvall, assistant superintendent of transportation of the United Railways & Electric Company, Baltimore, Md.

"I've been drafted," he said.

"Well, we're mighty sorry to lose you, Whitaker," said Mr. Duvall; "but the government will get another good man, and I know you will do your best for the flag just as you have for this company."

"I'll try, sir," said the caller; "and when we win the war I'm coming back for my job as conductor on the Harford Avenue line."

"Good!" said Mr. Duvall.

"Before I go," continued Whitaker, "I want to buy a Liberty Bond."

"Good again," said Mr. Duvall. "A \$50 or a \$100 bond?"

"I'll take a \$1,000 bond," replied Whitaker.

"How much do you want to pay down?" asked Mr. Duvall.

"All of it," answered Whitaker, and he produced a roll of bills from his pocket, from which he counted off \$1,000.

Mr. Duvall went with him to the office of the Maryland Trust Company where Whitaker paid for and got a receipt for a \$1,000 bond of the third issue.

This patriotic citizen who is going to fight for Uncle Sam and pay his own way, as it were, is John Howard Whitaker, Conductor No. 6936, of the Harford Avenue line of the Baltimore Company. He is thirty-one years old, and has been in the employ of the United Railways six years. He says he has put aside some of his earnings every payday since he has been in the service, and that the \$1,000 represents the savings of the past six years.

## Results of Toledo Audit

Inquiry Into Financial Condition of Toledo Company Indicates Inability to Meet Wage Demands

The Toledo Railways & Light Company, Toledo, Ohio, cannot grant the increase of 10 cents an hour to railway employees and a proportional increase to electrical workers, meet its obligations and keep its equipment in good condition unless an increase in the rate of fare is permitted, according to results shown by an examination of its books by expert accountants. This was disclosed at a conference on April 8, attended by representatives of the employees, Henry L. Doherty, chairman of the board of the company, and Mayor Cornell Schreiber. No details of the audit were given out at the time, but the statement seems to have been accepted by all.

Mayor Schreiber expressed the belief that the people would not sanction a higher rate of fare than is now in use. Representatives of the employees said they would not take snap judgment and that they do not want labor trouble of any kind if it can be prevented. They said, however, that in the end the temper and the necessities of the men would have to be considered. The power plants are furnishing service to several concerns engaged on government contracts, and there is no desire to interfere with them in any way.

It was intimated that it might become necessary for the government to take control of the situation in case developments indicate a possible tie-up of the electrical plants.

## Report Against Municipal Ownership

Representative Johnson, chairman of the district committee of the House of Representatives, on April 17 presented to the house his minority report against ownership and operation of the electric railway lines there by the District of Columbia. The report by Mr. Johnson is the minority opinion on the Crosser bill for municipal ownership. Chairman Johnson emphasizes the point that both the Crosser bill and the majority report, written by Representative Crosser of Ohio, are practically reprints of an earlier bill and report and that they do not fit local and present conditions in Washington. He points out that no hearings were held on the present bill and that at the hearings on the identical bill in the Sixty-third Congress only one of the fifteen witnesses stated it was the desire of a majority of the people of the district to have public ownership of the electric railways.



## Legislative Action Likely in Boston Case

### Public Control Bill with Service-at-Cost Provision Reported for Boston Elevated Railway

Service-at-cost with public control of the road for at least ten years is provided in a bill relative to the Boston Elevated Railway filed in the Massachusetts House on April 12 by the joint committee on metropolitan affairs and street railways. Twenty-six of the thirty members signed the report (House 1442). The bill was heard by the joint ways and means committee on April 16 and will receive further consideration by the same committee at a hearing on April 22.

#### TRUSTEES TO SERVE FOR TEN YEARS

The bill creates a board of trustees for the company, three of whom are to be appointed by the Governor and two by the Mayor of Boston, subject to the approval of the civil service commission and compensated at the rate of \$5,000 each annually. This board is to assume the management of the company for a period of at least ten years, one trustee serving as chairman. Any appointee may be removed for cause. All the rights and powers of the company and its directors are to be exercised by the trustees.

The latter trustees are to have the right to regulate and fix fares, including the issue, granting and withdrawal of transfers, the imposition of charges for these, and to determine the character and extent of the service furnished, and in these respects their authority is to be conclusive and not subject to the direction or control of any other State board or commission. No contracts are to be made for the construction, acquisition, rental or operation of additional rapid transit, surface or other lines beyond the present system limits without the consent of the directors of the company. The directors' duties are to be confined to maintaining the corporate organization during the public control period. By acceptance of the act the company assents to all security issues deemed necessary by the trustees.

#### TRUSTEES TO FIX FARES

Prior to or upon acceptance of the act, the company is to provide for the raising of \$3,000,000 in cash by the issue of preferred stock at not less than \$100 per share, which is to be subject to the preferred stock authorized upon the acquisition of the West End Street Railway. This preferred stock is to be entitled to cumulative, preferential dividends not exceeding 7 per cent annually and is to be subject to recall at the request of the trustees or after the period of public operation. Of the above \$3,000,000, \$1,000,000 is to be set aside as a reserve fund and the remainder is to be subject to the disposition of the trustees to pay for the cost of additions and improvements to the company's property.

The board of trustees is to fix fares to meet the cost of service, including operating expenses, taxes, rentals, in-

terest on all indebtedness, such allowance for depreciation, obsolescence and losses in respect to property sold, destroyed or abandoned as they may determine, all other expenditures chargeable against income or surplus, fixed dividends on all preferred stock, and dividends on the common stock at the rate of \$5 per share during the first two years, \$5.50 per share during the next two years, and \$6 per share during the balance of the period of public operation.

The fares which in the judgment of the trustees will meet the cost of service as above defined are to be put in operation within sixty days of the appointment of the trustees, and within sixty days thereafter the trustees are required to adopt and publish a schedule of eight different grades of fares, of which four shall be below and four above the rate of fare first established. Whenever by reason of any change in the existing rate of fare there are less than four grades, either above or below the rate then in force, the trustees are to adopt and publish a schedule of such additional rates so that there shall always be not less than four above and four below the existing rate of fare.

Changes in the fare steps may be made at the discretion of the trustees. The reserve fund is to be used only for making good the deficiency in income of the company or for reimbursing the State in case the fund exceeds the amount originally established. The State is to make up any deficiency in the reserve fund upon semi-annual notification. The State is to have the right of terminating public management at the end of ten years or thereafter upon not less than two years' notice. Quarterly checks are to be made of the reserve fund to abolish the ability of existing fares to meet service cost.

#### OPTION OF PURCHASE TO STATE

The bill contains provisions for procedure and treatment of the reserve fund in case the company is restored to private management. The acceptance of the act by the company is to constitute giving the State an option upon the property in case the State decided to purchase it at a later period.

With the exception of the section relating to the issue of \$3,000,000 in preferred stock, which is to take effect upon its passage, the act will take effect upon its acceptance by the holders of not less than two-thirds of the stock of the company, and upon certification that the entire \$3,000,000 referred to above has been subscribed for and at least 30 per cent paid in cash.

The act is to constitute a contract between the State and the company, and the trustees, according to its terms, would assume management on the first day of the month following their appointment.

Pending the further discussion of the

measure before the ways and means committee, Matthew C. Brush, president of the company, preferred not to be quoted in regard to the pending measure. At the hearing on April 16 F. E. Snow, counsel for the company, said that the establishment of inclosed transfer areas, construction of new stations on rapid transit lines and issue of stocks and bonds would be under the supervision of the Public Service Commission as in the past, with the exception of the \$3,000,000 rehabilitation and reserve funds.

Governor McCall's views upon the measure will be sought before the next hearing.

### Opportunities in the Ordnance Department

Two statistical engineers are needed by the Control Bureau, Ordnance Department, Washington. Each position calls for a man who is keen, an analyst, with vision, accomplished in the compilation of reports and statistics, and able to put himself in the reader's place. He should be a college or technical graduate and from thirty-five to fifty years of age.

There is also an opportunity for two men along the same line but with less experience and younger. Four men are also wanted experienced in cost keeping and bookkeeping, able to do the work themselves but with skill and initiative to get at the principles and analyze the work. They must be over the draft age. There is an opportunity here for men both with and without college degrees. Women college graduates with mathematical ability and actual practical experience in such work as bookkeeping and statistics and able to make charts of various kinds are also desired.

Anyone taking one of these positions will have the satisfaction of knowing that he or she is greatly helping the government. Applications should be addressed to Chief of Personnel of Control Bureau, Chief of Ordnance Department, Washington, D. C.

### Paper for B. C. Employees

The British Columbia Electric Railway, Vancouver, B. C., has begun the publication of the *B. C. Electric Employees' Magazine*. The first issue is dated April. It contains eight pages. The purpose of the publication is explained in an editorial in part as follows:

"Probably the story of *The Employees' Magazine's* birth will explain its appearance best. The need of a medium of communication between the numerous employees and departments of the company was voiced first by the executive of the office association. The suggestion was later placed before the management of the company and fully approved, with the result that this medium has been placed at the disposal of the employees by the company in which to print news and exchange views on current affairs about the company.



"The magazine, of course, is not confined to the Vancouver employees, the object being that all employees, even in the most isolated points of the company's territory—at Lake Buntzen, along the Fraser Valley, in the sub-stations, and so forth—should share in the making up of and benefits from the magazine."

## Cleveland Men Present Wage Request

**Want an Increase of 25 Cents an Hour in Wages—Other Demands**

The terms that will be demanded in their new contract with the company by the motormen and conductors of the Cleveland (Ohio) Railway were presented on April 15 by the representatives of the men.

The officers of the company also desire changes in the contract and they constitute rather a radical departure from those to which the men have been accustomed. One of them is that the company be permitted to employ women as drivers and conductors on an equitable basis with men. Another is that employees of the company shall not be required to become members of the union. The first is based upon the shortage of men, and the second upon the desire of the company for an open shop contract. The company wants to be relieved of the task of assisting union officials in the collection of dues and suggests a rearrangement of the seniority lists and schedules.

### WHAT THE MEN ASK

The men demand an increase of 25 cents an hour in wages; that 40 per cent of total runs be completed in eleven hours, 40 per cent in twelve hours, and 20 per cent in thirteen hours; that the minimum day be eight hours instead of five hours; that there be an eight-hour schedule Sundays and holidays; that night runs be eight hours with pay for ten hours; that time and one-half be paid for overtime; that tickets, transfers and money for change be furnished by the company instead of the men; that vestibules be heated; that a discharged employee be reinstated when the complaining passenger fails to appear against him within three days; that a real emergency must exist for posting emergency runs; that pay of employees commence when they report at their own stations instead of stations to which they are transferred in case of change of runs; that men be permitted to wear colored glasses; and that men be paid for time spent in court as witnesses in accident cases where the company is not directly involved, providing they make reports of such accidents.

These demands will be discussed at once, but it is generally thought that arbitration will be required to reach a settlement.

The changes suggested by the company would tend to make the contract more liberal and provide for such emergencies as may arise out of the war.

## Result of Shipyard Transportation Survey

**Development Planned Calls for Expenditure of \$9,000,000 for Additional Traffic Facilities**

In the investigation made from Feb. 22 to March 29 under the direction of A. L. Drum for the Shipping Board for the purpose of improving and enlarging the local passenger transportation service to all the shipyards on the Atlantic Coast in order adequately to serve the present employees and to determine the extent and reduce as far as possible the expenditures for new housing for the shipyard forces, traffic surveys and plans were made for improving the transportation facilities for twenty-eight shipyards now employing 70,100 men and requiring an increase of 67,000 men. At these shipyards and the adjacent war industries 96,400 men are employed. The total men required to be engaged on the work of ship building and adjacent war industries work will be nearly 200,000 at the following locations: Savannah, Newport News, Baltimore, Sparrows Point, Camden, Gloucester, Newark Bay, Staten Island, Newburgh, N. Y., Port Jefferson, L. I., Fore River and Squantum at Boston, Portsmouth, N. H., Groton and Bath, Me.

### TRANSPORTATION VS. HOUSING

The investigation developed that most of the shipyards requiring additional housing were on marshy land and subject to unhealthy conditions, so much so that it was necessary to locate any new housing from 1 to 2 miles distant from the yards and consequently requiring electric railway or steam railroad transportation for the men. In many instances some new housing is necessary. Permanent houses will usually require local transportation and will cost on an average of \$1,500 per man for the houses. For barracks located near the shipyards the cost is about \$350 per man. Estimates show that where about 2 miles of track extension are necessary from existing lines to the shipyards and a full complement of cars, substations, feeders and carhouses is required the investment averages about \$150 per man to be transported. These figures indicate the economy of developing existing transportation facilities over the making of large investments in temporary or permanent housing, even should the railway extension eventually be abandoned, because the cars and power supply, representing less than one-half the investment for even barracks would be available for future use.

### THE NEWARK DEVELOPMENT

The total development planned consists of increasing ferry boat service with existing boats, increasing steam railroad service with existing rolling stock, and making electric railway extensions and adding cars and power supply at a total cost of about \$9,000,000. This includes \$2,400,000 to be provided by the Pennsylvania Rail-

road and the Hudson & Manhattan Railroad for extending the Hudson Tube service to the Lincoln Highway at Port Newark, N. J., where it will serve 50,000 men, placing 30,000 of these within sixteen minutes of Cortlandt Street, New York, twenty-six minutes of Herald Square and thirty-one minutes of the center of Brooklyn.

After planning to utilize the existing housing to its utmost capacity by improving the transportation facilities the next effort was to permit the use of these transportation facilities to their fullest extent by spreading the shifts at the shipyards from one hour to one hour and one-half in order to secure two round trips in the morning and evening with each car in the service. The management of the shipyards are now working out plans for spreading their shifts an hour and thirty minutes.

### LABOR SHORTAGE A PROBLEM

The shortage of motormen and conductors for this peak load transportation service for the shipyards, due to the loss of men who went from the electric railways to the shipyards at rates of wages the electric railways cannot afford to pay, creates a serious difficulty. In this connection it has been suggested that arrangements be made with shipyard managements to permit old and trained electric railway men to operate cars to and from the shipyards, these men to be paid for this service by the railways and to work during the interval in the shipyards.

## Electric Carries Secretary Daniels

The Chicago, North Shore & Milwaukee Railroad hauled a distinguished party from Chicago to the Great Lakes Naval Training Station and back on April 10. Secretary Daniels of the Navy Department was in Chicago on that day and was scheduled to speak at the evening meeting of the United States Chamber of Commerce, but wanted to visit the Training Station in the afternoon.

In company with members of the Chicago Liberty Loan Committee, he was met by M. J. Feron, general superintendent of the railway, and boarded a special train of two cars at the elevated station at Adams Street and Wabash Avenue, Chicago. One car was an observation car, and the other a diner in which luncheon was served to the party en route. The trip to the Training Station was made in about an hour. After the inspection of that post by the Secretary, he returned in the same way to the stock yards in South Chicago, which were also inspected.

The Chicago, North Shore & Milwaukee Railway is doing a large passenger business to both Fort Sheridan and the Great Lakes Training Station from Chicago and Milwaukee.

## Carhouse Destroyed by Fire

Ninety-four Cars Burned at Boston  
With Loss of \$250,000 Covered  
by Insurance

Ninety-four cars owned by the Boston (Mass.) Elevated Railway and one sprinkler car owned by an outside concern were destroyed by a fire on April 7 which gutted the westerly section of the Clarendon Hill carhouse of the company, in the western part of the city of Somerville, Mass. The fire started about 6.35 p.m. and the flames spread so fast through the section of the building destroyed that only one car was saved.

### TYPES OF CARS DESTROYED

The section of the building destroyed was a wooden structure about 250 ft. square and two stories in height. Of the cars destroyed, seven were of the semi-convertible type, one was a modern trailer of the double-truck type, and ten were of the articulated type. The others were mostly 25-ft. and 20-ft. box cars. Five service and sand cars and sixteen snowplows were destroyed.

The newer section of the carhouse, built in 1911 of brick and concrete, withstood the flames as indicated in the accompanying illustration, and none of the cars housed in it was damaged.

The company handled the rush-hour traffic of the following morning by rearranging the service between Arlington Heights and Sullivan Square terminal for an additional transfer at Arlington Center.

On account of the destruction of tracks in the wooden section of the building, it became necessary to store cars on the street outside the Clarendon Hill carhouse, and the shortage of large cars resulting from the fire also made it necessary to press some smaller units of rolling stock into service, especially in handling the rush-hour traffic.

### WILL NOT REPLACE EQUIPMENT NOW

The cause of the fire is not known. In a statement to the public the company estimated the total loss at about \$250,000. This is probably covered by

insurance. It is not expected that the company will purchase any new passenger equipment at present to replace that destroyed, but it will probably be in the market in the near future for snowplows.

### Subway Survey Funds Sought

The City Council of Cleveland, Ohio, has been requested by the Cleveland Rapid Transit Commission to issue bonds to the amount of \$100,000 to secure funds for the preliminary survey and investigation for subway terminals at the Public Square and underground tracks in the congested business district. The work will be begun just as soon as funds are provided.

### Union Terminal for Oakland Mole

Creation of a union railway terminal at the Oakland mole to accommodate trains of the Southern Pacific, Western Pacific and Santa Fe Railroads, thereby releasing a large amount of equipment for other service while cutting down the expense of operating three terminals, is being planned by the engineering department of the three railroads. It is part of the working out of Director-General McAdoo's plans for the operation of the railway systems of the country as a unit, rather than as independent lines, and the impending change is one of the most radical steps taken since the government assumed charge of the operation of the railroad properties.

The union terminal proposal calls for a combination of the ferry services of the three transcontinental lines at the San Francisco bay terminal, combined and systematized handling of freight, combined stations at Richmond and in East Oakland, and the elimination of all unnecessary duplication of service. It has not been announced how the new move will affect the ferry service of the San Francisco-Oakland Terminal Railways (electric). This problem will be worked out in connection with the concentration of passenger and freight service from the interior on Oakland mole.

## Storage and Distribution

Coal Problems of Electric Railways  
Being Taken Up with Fuel Administration in Washington

Electric railway men are visiting Washington with the hope of getting straightened out some of the difficulties which have confronted them as a result of the suggestion of the storage of coal made by the Fuel Administration on March 29. They are endeavoring to point out to the Fuel Administration and other government officials the necessity of making miners and coal operators responsible for the production of clean coal. Philip J. Kealy, president of the Kansas City Railways, has been one of these visitors to Washington, and he has been endeavoring to point out, for the benefit of all the electric railway companies which might be laboring under the same difficulty as that of Kansas City, that it is impossible to store bad coal more than four weeks because of the danger of spontaneous combustion.

### ZONE SYSTEM COMPLICATES MATTERS

The zone system of distribution recently ordered by the National Fuel Administration, in the opinion of some electric railway operators, complicates the practical execution of the recommendation for the storing of large quantities, issued by the Fuel Administration on March 29. The question of contract and the time within which these contracts were to expire enter into the question of storage. Complaint is also being made in Washington that some of the public utilities are not receiving the attention needed in the way of coal shipments.

P. H. Gadsden, in charge of the War Board of the American Electric Railway Association, is constantly in touch with the Fuel Administration, and at the office of Dr. Garfield it was said to a representative of this paper that his advice on the subject of the troubles of electric railways is constantly being sought.

### George Ade Lifts His Voice

The man or woman who needs to be convinced in 1918 that our cause is just and our motives clear is not worth bothering over.

We are too busy these days to stop and try to pump blood into shellfish.

Our present occupation is to sort out the quick from the dead.

Every resident of the U. S. A. is to be tagged, either as an asset or a liability.

This is no time for pinching and piking.

Be a true sport. Clean every pocket. Throw your bank roll on the table and say to Uncle Sam, "Take any part of it."

Is it true, as reported, that this weather finds the cold feet not in the trenches, but propped against base-burners in our most respectable sitting rooms?

Let us hope not.—GEORGE ADE.



REMAINS OF CLARENDON HILL CARHOUSE

## News Notes

**Wage Increase in Urbana.**—The Kankakee & Urbana Traction Company, Urbana, Ill., has increased wages from 28 cents to 30 cents an hour for trainmen who have worked less than two years and from 30 cents to 35 cents an hour for men who have served longer than two years.

**Wage Increase in Harrisburg.**—Increases of 2 cents an hour for all employees have been announced by Frank B. Musser, president of the Harrisburg (Pa.) Railways, and C. H. Bishop, president of the Valley Railways, Lemoyne, Pa. Both increases are effective at once.

**Report on Traffic in Bethlehem.**—Delos F. Wilcox, New York, N. Y., engaged by the Chamber of Commerce of Bethlehem, Pa., to make a survey of electric railway conditions in that city and vicinity, has submitted a complete report which will probably be used on June 5 when the complaint of the city of Bethlehem vs. the Lehigh Valley Transit Company will be heard.

**Lake Shore Cars Burned.**—Fire destroyed six interurban cars in the carhouse of the Lake Shore Electric Railway at Beach Park, Ohio, on the morning of April 15. The loss is about \$72,000. Three of the cars were practically new. They were valued at \$14,000 each. The fire is supposed to have originated from a stove in one of the cars. The company's fire apparatus finally subdued the blaze.

**Officers of Wisconsin Electrical Association.**—Owing to several typographical errors in the list of officers elected at the recent meeting of the Wisconsin Electrical Association and reported in the issue of April 6, the list is repeated: President, John St. John, Madison; first vice-president, Raymond H. Smith, Madison; second vice-president, W. C. Lounsbury, Superior; third vice-president, A. C. Babson, Watertown; secretary-treasurer, J. P. Pulliam, Milwaukee.

**Bus Application Put Over.**—The application of the Fifth Avenue Coach Company for a change in routes and six months' extension of its temporary permit was laid over by the Board of Estimate during the week ended April 13 until May 10. Representatives from Harlem asked that a crosstown line be operated on 125th Street. Borough President Dowling pointed out that there was an electric railway on the street and the best thing to do was to ask the company to increase its service.

**Government Starts Welding School.**—A course in oxy-acetylene welding and cutting will be opened at the Military Trade School, Washington Barracks, D. C., on May 1. It is designed to fit men

to cope with all military problems involving cutting and welding in the field. Sixty men from the First Replacement Regiment of Engineers will take up this study. They will be taught metallurgy in connection with the welding of cast iron and steel, malleable iron and steel, malleable iron and aluminum, copper and other metals, and will study gases, fluxes, torches, etc.

**Interurbans Advertise Liberty Loan.**—A striking and well written full page advertisement on the Third Liberty Loan has been contributed by the interurban companies of Indianapolis to the Indianapolis News. The companies that participated were the Terre Haute, Indianapolis & Eastern Traction Company, the Union Traction Company of Indiana, the Indianapolis & Cincinnati Traction Company and the Interstate Public Service Company. The advertisement was a most patriotic appeal to citizens of all classes to participate in the loan.

**Bus Application Denied.**—The Public Utilities Commission of Illinois has denied the application of the Motor Bus Company to operate a fleet of motor buses in Springfield, Ill. The commission held that transportation facilities in that city were adequate and that competition with the Springfield Consolidated Railway would work to the detriment of the public. The decision ends the attempt of union labor to operate buses in direct competition with the railway. Agitation for such service followed the strike of the railway employees a few months ago.

**Safeguarding Industries from Enemies Within.**—The National Americanization Committee, with headquarters at 29 West Thirty-ninth Street, New York, N. Y., is issuing suggestions on the protection of property in this country during the war. A recent bulletin entitled "Safeguarding Industries from Enemies Within" makes a series of ten suggestions such as a census of employees, appointment of watchmen, admission of visitors, etc. Although primarily intended for manufacturers, these bulletins should be of value in the protection of power plants and other portions of an electric railway system.

**\$24,000,000 in Chicago Traction Fund.**—Payments to the city's traction fund for the fiscal year ended Jan. 31, 1918, have been made by the companies constituting the Chicago (Ill.) Surface Lines. The total was \$2,036,754. This was a decrease of \$710,235 as compared with the city's share in the preceding year. With this addition the traction fund reaches to a total of almost \$24,000,000, representing 55 per cent of the net receipts during the last ten years and accumulated interest. If the pending ordinance is approved it is likely that this money will be used for building subways to be owned by the city and leased to the local railway companies.

**United Railroads Sues San Francisco.**—The United Railroads, San Francisco, Cal., filed in the Superior Court on April 8, a suit

against the city and county of San Francisco in which \$865,250 is asked for damages alleged to have been sustained as a result of the city's paralleling tracks on Market Street from Van Ness Avenue to Church Street. It is alleged that the city's action has caused a depreciation in the value of the United Railroads' franchise and has caused the company to suffer a loss of patronage. Attention is called to the fact that a claim for these alleged damages was filed with the Board of Supervisors last October and that the claim has been denied.

**New York Giants vs. Interboroughs.**—New York has had its first double-header. The event occurred at the Polo Grounds on April 15. The participants in the night cap were the New York Giants and the Interboroughs, composed of the champions of the league of employees of the Interborough Rapid Transit Company. The Interboroughs lost, but then consider the prowess of their opponents. The tale is told mostly in a bad first inning, in which the Giants scored seven runs. The final score was eleven to three in favor of the Giants. The Giants made ten hits against the railway men's eight, while the former made one miscue and the Interboroughs only two. In the sixth the Interboroughs mauled Rube Benton for five hits and three runs.

## Programs of Meetings

### Machinery Makers to Convene

A war convention of the machinery, tool and supply industry of the country will be held in Cleveland, Ohio, the week of May 13. The convention will be a joint meeting of four great national associations, the American Supply & Machinery Manufacturers' Association, the National Supply & Machinery Dealers' Association, the Southern Supply & Machinery Dealer's Association and the National Pipe & Supplies Association. The associations that plan to participate will meet to co-ordinate their efforts toward one goal, "More Ships, More Shells."

### New England Street Railway Club

For the meeting of the New England Street Railway Club on April 25 an inspection visit to the new plant of the Massachusetts Institute of Technology has been arranged, starting at the main entrance under the dome, at 4 p.m., in charge of special guides. At 5.45 p.m. the club members will again assemble at the main entrance, from which point they will march to the "Tech" dining headquarters, where dinner will be served. The meeting will be held in the large lecture room on the second floor, under the dome. The speakers will be John Ritchie, Jr., of the Massachusetts Institute of Technology, and C. R. Dooley, of the Westinghouse Electric & Manufacturing Company. Mr. Ritchie will have for his subject "Training Men for War Service." Mr. Dooley will have for his subject "Training Men for Industrial Service."

# Financial and Corporate

## Let's Go to Hongkong!

Net Profits in Last Two Years Have Almost Equaled Capitalization of Tramway

The success of the Hongkong government in bringing the subsidiary coinage of the colony to par, the increase in the exchange value of silver and increasing traffic have resulted in making the Hongkong tramway system a veritable gold mine for its owners. The annual report for 1917 indicates that the net profits of the company, after paying all charges and interest on bonds and including the balance carried over from the previous year, reached \$296,635 (U. S. gold) on a capitalization of only \$395,400.

In 1916 the net profits of the company, after paying all charges and including the balance carried over, amounted to \$211,800, out of which the company paid total dividends of 30 per cent and carried forward \$81,300 gold. Despite the large profits the dividends for the past year amounted to only 23 per cent, the company carrying forward \$205,690, or 52 per cent of its capital.

### MAY BE STOCK DIVIDEND

There is considerable discussion in financial circles in Hongkong as to the reason for this very large balance carried forward, but the general opinion seems to be that it forecasts a stock dividend, which can readily be made one new share for each two old shares. It is also surmised that the company is arranging to retire a considerable amount of its outstanding bonds, which can be done to best advantage with silver exchange at its present point. The net profits for the past two years amounted to almost exactly the total capital of the company. Considerable sums have been allowed for writing off deterioration of plant.

### EXCHANGE HAS HELPED

The company has operated its 10-mile line on the basis of a fare of 10 cents first class and 5 cents third class, having abolished a second-class fare of 8 cents. No transfers are permitted. In normal times this first-class fare of 10 cents, Hongkong currency, works out a little less than 4.5 cents gold. At the exchange which has obtained in the past year, however, it works out almost 7 cents gold, the third-class fare being in proportion.

Another important feature in the company's prosperity has been the fact that subsidiary silver coins in Hongkong have been brought to and maintained at par. Up to two years ago the subsidiary coins in Hongkong (the 5, 10, and 20 cent pieces) circulated at a discount of 5 to 12 per cent, as compared with the corresponding standard

silver dollar. For example, it might require eleven 10-cent pieces or fares on the tramway to earn a standard silver dollar. The company's loss annually from this cause, about \$20,000, has been almost entirely prevented since the subsidiary coins were brought to par.

### TRAMWAY'S GROWING POPULARITY

The cost of operating the line is exceptionally low, because of the cheapness of labor and the comparatively low power required. The greatest element in the company's prosperity, however, has been the increasing use of its cars by all classes of the community. This is especially the case in first-class fares, which a few years ago were comparatively few. It has come to be the accepted thing at present for non-Chinese to use the tramway instead of jinrickshas for longer trips, and the use of the cars by first-class patrons to one of the leading golf courses, to the bathing beaches and to pleasure resorts has perceptibly increased.

## Atlanta Stockholders Seek Relief

A committee of stockholders of the Georgia Railway & Power Company, Atlanta, Ga., has published in an advertisement in the Atlanta papers a pertinent statement of facts relative to the conditions which confront that company. Attention is called to the purpose of the company to apply at an early date to the Railroad Commission for its authorization of rate increases which will enable the company to continue to furnish good service to the public, and, at the same time, meet its obligations. On this point the statement said:

"The company is at the present time constructing additional water power plants at a cost of approximately \$5,000,000 in order to increase the supply of power which is vital to the country's needs in the prosecution of the war and of the utmost importance to Atlanta and the State of Georgia.

"The officers of this company have been directed to make application to the Railroad Commission of Georgia for an increase in rates in all departments, it being our opinion that unless such increases are granted the company will not have resources sufficient to meet increased interest and taxes, increased cost of materials and the increased rates of wages which it must pay in order to retain or secure the men necessary to enable it to furnish its present varied services which are so essential to the community and the country in this critical time, and without the granting of which increase of rates the company will be unable to push speedily to completion its new water power plants."

## Operating Costs High in Jersey

Railway Gross Shows Average Increase, but Expenses Make Higher Rates Necessary—Fuel Alone Up \$2,500,000

Smaller net earnings were the result of 1917 operation by the Public Service Corporation of New Jersey, Newark, N. J., owing to the higher costs of operation. The fuel bill alone of the three operating companies was approximately \$2,500,000 in excess of what it would have been for the same amount of coal at 1916 prices.

The operating revenue of the electric railway, electric light and gas subsidiaries increased \$4,742,567 in the last calendar year, or 11.1 per cent. The operating expenses, however, including amortization charges and taxes, rose \$4,675,514 or 18.1 per cent. The non-operating income fell off and revenue deductions of subsidiaries increased. The final result was a net increase of \$2,494,561 in surplus before the payment of dividends, as compared to \$2,947,693 in 1916. The company paid dividends of 8 per cent or \$2,399,968.

During 1917 the operating revenues of \$19,494,677 for the electric railway

### INCOME STATEMENT OF PUBLIC SERVICE CORPORATION OF NEW JERSEY FOR CALENDAR YEAR 1917

Operating revenue of subsidiary companies.....	\$47,291,342	
Operating expenses, including amortization charges and taxes.....	30,539,369	
Operating income.....	\$16,751,973	
Non-operating income.....	397,706	
Gross income.....	\$17,149,679	
Income deductions of subsidiary companies (bond interest, rentals and miscellaneous interest charges).....	12,299,838	
Net income of subsidiary companies.....	\$4,849,841	
Public Service Corporation income from securities pledged (exclusive of dividends on stocks of operating companies) and from miscellaneous sources	\$1,953,097	
Less expenses and taxes.....	223,232	\$1,729,865
		\$6,579,706
Public Service Corporation income deductions:		
Interest on perpetual interest bearing certificates.....	\$1,202,986	
Interest on Public Service general mortgage 5 per cent bonds	1,875,000	
Interest on 5 per cent collateral notes.....	375,000	
Interest on miscellaneous obligations.....	343,645	
Amortization of debt discount and expense	159,238	
Sinking fund for Public Service general mortgage 5 per cent bonds	209,500	
Other contractual deductions from income	36,936	\$4,202,306
Net income of Public Service Corporation and subsidiary companies.....	\$2,377,399	
Appropriation accounts of subsidiary companies:		
Amortization of new business expenditures prior to Jan. 1, 1911.....	\$40,329	
Adjustments of surplus account (credit)	140,006	99,676
		\$2,477,076
Appropriation accounts of Public Service Corporation (exclusive of dividends) (credit).....		17,484
Net increase in surplus before payment of dividends.....		\$2,494,561



department showed about the average rate of increase—6.70 per cent. As against this operating expenses showed an increase of 12.70 per cent over the preceding year, reflecting the marked rise in the cost of labor and materials. The growth in operating revenues was \$1,105,672, to earn which 1,122,695 additional car miles were operated.

There was a phenomenal development in war industries during the last year in the territory served by the railway lines. The manufacture of munitions and war supplies engaged the services of thousands of men and women; existing shipyards were enlarged and new ones constructed. In addition the government caused the erection of quartermaster's and engineers' depots, cantonments and various other buildings for use of war enterprises. All of these operations necessitated the employment of large forces of men, and the transportation of these workers severely taxed the railway facilities.

The revenue from transportation increased from 31.412 cents per car mile to 32.485 cents per car mile, or 1.073 cents per car mile. Operating revenue deductions increased from 20.354 cents per car mile to 22.340 cents per car mile, notwithstanding smaller depreciation charges. The ratio of operating revenue deductions to operating revenue was 67.1 per cent. Car mileage increased 2.0 per cent. Other statistics are shown in the accompanying table.

The railway claim department in 1917 spent, including its administration expenses, \$751,096, or 4.13 per cent of the gross passenger receipts. This was an increase of approximately \$88,000 over the outlay for 1916. The larger expenditures are attributable to the greater volume of business done by the company and also to the vastly increased use of the highways by other vehicular traffic, especially motor cars.

The increase in kilowatt-hours commercially sold by the electric light department was 90,637,616, or 32.27 per cent. The revenue from electric sales increased 18.57 per cent. The ratio of operating revenue deductions to operating revenue was 61.7 per cent, as against 58.4 per cent for the corresponding period of the year previous. The sales of the gas department increased 1,211,012,515 cu.ft., a gain of 9.77 per cent, and the revenue from sales of gas increased 8.72 per cent.

The taxes for the year 1917 amounted to \$3,974,983, an increase of \$1,261,924, or 46 per cent, over the previous year. Beginning with 1918 the rate of franchise tax payments will be increased 1 per cent a year until 1920, by which time the gas and electric departments will, like the railway, be paying in the form of franchise taxes 5 per cent of their gross receipts.

The fire insurance in force as of Dec. 31, 1917, amounted to \$35,889,977, an increase of \$2,938,941 over the corresponding period of the year previous. Premiums paid aggregated \$114,507, an increase of \$8,073. The average rate paid was 31.9 cents per \$100 of insurance, as against an average rate of 32.3 cents for 1916.

	1917	1916
Revenue passengers.....	361,187,782	342,205,993
Transfers and passes.....	115,787,201	109,492,019
Total passengers.....	476,974,983	451,698,012
Percentage of passengers using transfers.....	21.9	21.8
Average fare per passenger (cents).....	3.82	3.82
Car miles.....	56,087,403	54,964,708
Car hours.....	6,021,225	5,911,131
Passenger receipts per car-mile (cents).....	32.44	31.37
Passenger receipts per car-hour (dollars).....	3.02	2.92

Expenditures for the work of the welfare department, including payments made under the workmen's compensation act, amounted during 1917 to \$184,277, an increase of \$18,422 over the preceding twelve months. Of the total sum \$98,418 was for welfare work, disbursed as follows: Insurance, \$23,191; sick benefits, \$27,004; pensions, \$33,846, and expenses, \$14,376. Most of the increase of \$10,050 in the total of the foregoing items was due to additional pensions.

Two Values Given for St. Louis by Mr. Allison

Engineer Engaged by City Says United Railways' Property Is Worth \$48,784,490 on Basis of Money Invested, But That the Reproduction Cost Is \$72,589,141

An official valuation of the property of the United Railways, St. Louis, Mo., has been made by James E. Allison, employed by the city for that specific purpose.

Mr. Allison has made the report that the actual capital invested upon which returns should be allowed is \$48,784,490. Mr. Allison has also made a second valuation, that of cost of reproduction at the present time. This amounts to \$72,589,141.

The estimate made by Mr. Allison of the capital entitled to a return on the basis of actual cost as of Dec. 31, 1917, shows the following totals for the various items:

COST OF PHYSICAL PROPERTY		
1. Construction cost.....	\$32,548,016	
2. Contingencies.....	1,615,955	
3. Engineering.....	1,857,381	
4. Interest during construction.....	1,256,947	
5. Taxes during construction.....	266,267	
6. Insurance during construction.....	71,655	
7. Total construction and overhead.....		\$37,616,221
8. Depreciation (wrong in principle and confiscatory) no deduction made.....		
9. Working capital (stores and cash).....	\$1,250,000	
10. Real estate (not original cost).....	2,410,421	3,660,421
11. Total physical property.....		\$41,276,643
OTHER THAN PHYSICAL PROPERTY		
12. Cost of initial promotion.....	\$1,000,000	
13. Cost of initial organization.....	224,720	
14. Capitalization of initial risk.....	2,000,000	
15. Cost of assembling capital (5 per cent of items 11 and 13 and \$198,152 of 16).....	2,084,975	
16. Cost of consolidation.....	2,198,152	
17. Allowance for super-seeded property (amortized).....		
18. Total cost other than physical property.....		\$7,507,847
19. Total capital entitled to return.....		\$48,784,490

The cost of injuries to employees, coming within the scope of the compensation act, was \$85,808, or \$8,371 more than the year before. It was divided as follows: Payments required by law, \$63,783; additional payments over and above those required by law, \$9,374, and expenses of department, \$12,650. There was a decrease of from twenty-five to twelve in the number of deaths reported during the year as compared with 1916, but the payments increased \$6,669, owing to the fact that obligations for previous death claims and permanent injuries extend over a period of 300 weeks.

During 1917 the corporation expended \$8,680,471 for fixed capital purposes, the net increase for the railway being \$2,243,160. The two largest items for this department were \$1,060,840 for cars and \$479,977 for electric equipment of cars. Paving expenditures totaled \$278,219.

The estimate made by Mr. Allison of the valuation of the company on the basis of reproduction cost as of Dec. 31, 1917, is as follows:

1. Construction costs (actual).....	\$32,548,016	
2. 20 per cent advance in prices.....	6,509,603	
3. Construction (reproduction).....		\$39,057,61
4. Contingencies 10 per cent of item 3.....	3,905,761	
5. Engineering 5 per cent on items 3 and 4.....	2,148,169	
6. Interest during construction 10 per cent on items 3, 4 and 5.....	4,511,155	
7. Taxes and insurance 3 per cent items 3 and 4.....	1,288,901	
8. Total overhead.....		\$11,853,987
9. Total construction and overhead.....		\$50,911,607
10. Real estate.....	2,410,421	
Interest on real estate, 12 per cent.....	289,250	
11. Working capital.....	1,250,000	\$3,949,672
12. Total physical properties.....		\$54,861,279
COST OTHER THAN PHYSICAL PROPERTY		
13. Promoter's reward.....	\$1,000,000	
14. Organization.....	500,000	
15. Capitalization of initial risk 15 per cent of items 12 and 14.....	8,304,191	
16. Cost of assembling capital 3 per cent of items 12 and 14.....	2,768,063	
17. Total cost other than physical property.....		\$12,572,255
18. Total reproduction cost.....		\$67,433,535
(Without Contractor's Profit.)		
The above table is prepared without contractor's profit. This item is often allowed and if considered in this case the figures would be changed as follows:		
Item		
12b. Total physical property (item 12 plus 10 per cent of items 3-4).....		\$59,157,617
13b. Promoter's reward.....	\$1,000,000	
14b. Organization.....	500,000	
15b. Capitalization of initial risk 15 per cent of items 12b and 14b.....	8,948,642	
16b. Cost of assembling capital 5 per cent of items 12b and 14b.....	2,982,880	
Totals other than physical property.....		\$13,431,523
Total reproduction cost.....		\$72,589,141



The estimate of \$48,784,490 is \$11,145,823 less than the \$60,000,000 fixed in the franchise settlement ordinance recently passed by the Board of Aldermen, while the estimate of \$72,589,141 is \$12,589,141 higher than the amount fixed in that ordinance. The settlement grant is now before the Mayor.

### W. S. S. Sold by New York Railways

D. W. Ross, vice-president of the New York (N. Y.) Railways, who is chairman of the city transportation division of the National War Savings Committee, has organized the following executive committee for that division: J. J. Dempsey, Brooklyn Rapid Transit Company; George Keegan, New York Railways; E. A. Maher, Jr., Third Avenue Railway; F. H. Sillick, Hudson & Manhattan Railroad; W. O. Wood, New York & Queens County Railway; M. Furrer, secretary.

War savings stamps have been placed on sale in the general offices of the New York Railways, at 165 Broadway and 21 Park Row; also in the employees' stores at 820 Eighth Avenue and 2850 Eighth Avenue; in all recreation rooms; in the storekeepers' offices at Ninety-ninth Street and Lexington Avenue, and 148th Street and Seventh Avenue, and at other places.

The Brooklyn Rapid Transit Company has placed the stamps on sale at its main office at No. 85 Clinton Street, and at the clubhouse of the men at East New York, and the Third Avenue Railway and Hudson & Manhattan Railroad also have them on sale.

### Return for Iowa Interurbans

According to the thirty-ninth report of the Iowa Board of Railroad Commissioners, just now available, the 1916 gross earnings of interurban electric railways in the State were \$3,120,004 as compared to \$2,923,032 in 1915. The operating expenses increased from \$1,895,925 in 1915 to \$1,967,476 in 1916, so that the net earnings from the operation in the last year were \$1,152,527 as compared to \$1,027,107 for the year preceding. The single track mileage increased from 472.48 miles to 483.31 miles, and the net earnings per mile from \$2,173 to \$2,384. The change in mileage was due to the addition of 23.35 miles for the electrification of the Charles City Western Railway, the elimination of some street railway mileage and other small adjustments.

### More Revenues Are Needed

The operating expenses of the Indianapolis Traction & Terminal Company, Indianapolis, Ind., which leases the property of the Indianapolis Street Railway, increased \$146,883 during 1917. The expenses for 1916 were \$2,065,129 and for 1917 \$2,212,102. The gross earnings increased only \$15,757, being \$3,654,683 in 1917 and \$3,638,908 in 1916. At the annual meeting on April 11 the stockholders were impressed with the fact that the company must secure a fare rate to balance expenses.

## Financial News Notes

**Issue of Notes Authorized.** The Illinois Public Utilities Commission has authorized the Central Illinois Public Service Company, Mattoon, Ill., to issue \$75,000 of gold notes.

**Wants to Issue Bonds.**—The City & Suburban Railway, Brunswick, Ga., operating 8 miles of line, has filed a petition with the Georgia Railroad Commission for permission to issue \$19,000 of bonds. The proceeds will be used to pay for extensions and improvements already made. A hearing has been set for April 23.

**Jamestown Line Showed Loss.**—The Jamestown (N. Y.) Street Railway operated at a loss in 1917. The annual report of the company shows that operating revenue for the year ended Dec. 31, 1917, was \$110,738, with operating expenses of \$119,413. The operating expenses during the previous year were only \$78,983. Income from operation showed a loss of \$12,117, as compared with a gain of \$18,430 for 1916. Gross income showed a loss of \$5,763 during 1917, as compared with a profit of \$24,374 for the year before.

**Hearing on Indiana Purchase Plan.**—A hearing was held recently before the Indiana Public Service Commission on the application of the Terre Haute, Indianapolis & Eastern Traction Company for permission to purchase the Western Indiana Utilities Company, West Terre Haute, Ind., by paying \$121,000 for the \$50,000 of common and \$150,000 of preferred stock. Robert J. Todd, president of the Terre Haute, Indianapolis & Eastern Traction Company, testified before the commission that the property of the Western Indiana Utilities Company was worth \$121,000. The plan for the purchase was referred to in the ELECTRIC RAILWAY JOURNAL of Feb. 16, page 338.

**55 Per Cent Increase in Gross in Quarter for Camp Line.**—According to the New York American of April 17 the Piedmont & Northern Railway, Charlotte, N. C., is running up record passenger earnings owing to its Spartanburg Camp business. That paper said: "A report just to hand shows that passenger revenues in the last week of March increased 147 per cent over the same week a year ago; for all of March, 155 per cent over March, 1917, and for the first three months of the year, 131 per cent over the first quarter in 1917. Freight revenues, however, increased only 18 per cent during the quarter. Gross for the quarter was \$322,150, an increase of \$114,924, or 55½ per cent."

**Harrisburg Traffic Gained 16 Per Cent.**—During 1917 28,482,163 passen-

gers rode on the various lines of the Harrisburg (Pa.) Railways. The total is 3,939,157 higher than in 1916, or an increase of 16 per cent. The annual report of the company for 1917, however, shows an increased cost of fuel amounting to 152 per cent and a wage increase of 27.43 per cent. The gross earnings increased \$155,673 or 15.3 per cent, and net earnings increased \$11,768 or 5.6 per cent. Operating expenses increased \$136,520 or 28.9 per cent. The percentage of operating expenses to gross earnings was 52.05 per cent in 1917, an increase of 5.45 per cent over 1916.

**Application to Issue Bonds.**—The Southern New York Power & Railway Corporation, Cooperstown, N. Y., on April 11 filed with the Public Service Commission, Second District, a petition asking for authority to execute a first mortgage to the Equitable Trust Company, New York, as trustee, to secure an issue of \$5,000,000 of 6 per cent ten-year first mortgage bonds and for an amendment of a prior order of the commission to authorize the immediate issue of \$952,000 in bonds in exchange for outstanding bonds and the issue of \$48,000 additional upon the acquisition of a like amount of the capital stock of the Southern New York Power Company, the proceeds to be used by the latter to acquire a like amount of the Deposit Electric Company. The petition states that the remaining \$4,000,000 in bonds is to be issued from time to time for the acquisition of additional property and for extensions, additions, improvements and betterments to the petitioner's property or of any subsidiary corporation. The commission will give an early hearing. An offering of bonds of this issue by P. W. Brooks & Company, New York, N. Y., was noted in the ELECTRIC RAILWAY JOURNAL for April 13,

## New Publication

### Railway Statistics of the United States for 1918

Compared With Official Reports for 1916 and Recent Foreign Railway Statistics. Prepared by Slason Thompson, Bureau of Railway News and Statistics, Chicago, Ill. 124 pages, paper covers.

This is the fourteenth year in which Mr. Thompson has issued his well-known analyses of railway statistics. The figures are obtained from official sources, but the selections and comparisons are prepared by his bureau. The strenuous experience through which the steam railroads have passed during the last year makes this book of particular interest at this time. The figures given are by no means confined to the earnings and expenses of the roads. Collateral figures are included, such as cost of living, number of stockholders of important railway properties, public service of the railways, railway legislation, etc.

# Traffic and Transportation

## St. Louis Fare Case Again

Considerable Ground Covered at Hearings on April 8 and 9, but Case Goes Over to April 22

On April 8 and 9 the hearings were continued that were begun some time ago before the Public Service Commission of Missouri on the application of the United Railways, St. Louis, Mo., for an increase in fares. An adjournment was then taken until April 22.

### PRESIDENT McCULLOCH ON COMPANY'S NEEDS

On April 9 Richard McCulloch, president of the company, testified that in the next five years it will cost the company \$6,700,000 to replace cars, power houses and equipment. As to a prospective wage increase, he said he felt that an increase of 10 cents an hour in the wages of the company's employees would be justified. The men have asked for an increase of about 14 cents an hour. According to Mr. McCulloch the company's net earnings for the last five years has been expended for maintenance instead of being paid as dividends and that this alone has saved the company from bankruptcy and a receivership.

James E. Allison, former engineer of the St. Louis Public Service Commission, was cross-examined at length by Judge Henry S. Priest, chief counsel for United Railways, after he had testified that the true value of a property was the amount of money it would bring if sold in the open market. Mr. Allison recently submitted to the Public Service Board an estimate that the actual present value of the company's properties is \$48,000,000, and that it would cost \$72,000,000 to replace the properties at present prices for material and labor. A summary of his figures is published in the department "Financial and Corporate," elsewhere in this issue.

### COMPANY'S ATTITUDE ON NEW FRANCHISE

Mr. McCulloch resumed the stand on April 9. He was examined by Counselor Daues for the city, who questioned him as to whether the company would accept the recent franchise settlement ordinance. Mr. McCulloch would not say definitely that the company would reject the ordinance, but he described it as "unsatisfactory under present conditions." There was much testimony in regard to the probable future earnings of the company, about the cost of financing at this time and to the probable needs of the company in the way of capital if the financial readjustment is brought about that is required for the company to comply with the terms of the new grant.

Edward McMorrow, national organ-

izer for the Amalgamated Association stated, the case for the employees as follows:

"We have postponed arbitration of the wage demands until after this commission acts on the fare increase, because we do not want to do anything to embarrass the company. At the same time we call attention to the fact that 30,000 people are dependent on the company's employees for their living. The company has said it is willing to give a wage increase of 5 cents or 10 cents an hour. We are asking an eight-hour day and 40 to 45 cents an hour, and I miss my guess if the men will be satisfied with less. Still, we mean to stand by the principle of arbitration. In Cleveland the men are asking for 60 to 65 cents an hour."

## Maximum Fare in Cleveland

Railway There Operating at Highest Fare Provided for in Model Service-at-Cost Ordinance

The Cleveland (Ohio) Railway is now operating on the highest rate of fare provided by the Tayler grant. The change was made at midnight, April 9-10. The rate is 4 cents cash and seven tickets for a quarter, with a 1-cent charge for transfers and no rebate. The only difference between this rate and the one used for the previous week is the retention of the money received for transfers.

The officers of the Cleveland Railway said that experience of a week with the next lower rate showed that it produced less income than the one discarded before that period. This was six tickets for 20 cents and 1 cent for a transfer with no rebate. J. J. Stanley, president of the company, wanted to advance the rate to the maximum when the first of the recent changes was made, but the company was met by an injunction in Common Pleas Court. This restraining order was dissolved on April 2 by the Court of Appeals. These various moves were reviewed in the ELECTRIC RAILWAY JOURNAL of April 6, page 680.

### FAILURE OF NEW RATE PREDICTED

It is predicted by some that even the highest rate provided by the franchise will not be sufficient to pay operating expenses and dividends and that the Council will eventually be asked to amend the franchise to allow an increase in fares commensurate with the growing cost of operation. The increase just made will yield additional revenue of about \$600,000 a year, but much of the additional funds will probably be absorbed in the wage adjustment to be made on May 1.

## Zone Fares for Lynn

Tentative Agreement on Rates Between Lynn Representatives and Bay State Street Railway

Following conferences between representatives of the city of Lynn, Mass., and W. B. Donham, receiver of the Bay State Street Railway, a tentative agreement has been reached with respect to the zone system of fares proposed by the company and now before the Public Service Commission for consideration relative to the entire system. The system for cities is accepted in principle by the Lynn representatives, but the zone limits are subject to adjustment in detail, before the schedule is put into operation. It is understood further that an effort will be made before April 26 to adjust these zone points between the particular communities affected and the company. If an agreement cannot be reached in any particular case the problem is to be left to the commission.

Subject to the foregoing, the conferees recommend immediate adoption of the zone system, and the company makes its concession only for immediate adoption of all pending schedules. The following modifications are to be made in the schedule as filed with the commission:

### HOW THE FARES WILL BE FIXED

The company is to sell six tickets for 30 cents, good only on local rides but valid at all times to and from the center or transfer point in the first zone. No transfers will be issued and no rides through the center will be allowed on these tickets. The company is to sell seven tickets for 50 cents and these are to be good in exactly the same manner to and from the center of the first zone to any part of the second zone. No other all-day tickets will be issued in these two zones. Through riders and riders desiring transfers at the center of the first zone, will pay 6-cent cash fares in the first zone and 2-cent cash fares in the second zone, making a total of 8 cents.

In addition to the above tickets the company will experimentally add the following tickets designed to build up traffic in the "off-peak" hours of the middle of the day, these tickets being sold as follows: Six tickets for 25 cents good only on local rides to and from the center of the first zone. No transfers or through rides allowed on these. Four tickets for 25 cents good in the same manner to the center of the first zone from the second zone.

These "off-peak" tickets will be good as follows: From 9 a.m. to 4.30 p.m. on week-days (except Saturday). Subject to change to 4 p.m. in any locality if it becomes necessary on account of changes in industrial closing hours to avoid overlapping with the peak load. The tickets will be good from 9 a.m. to 6.30 p.m. on Saturdays, but will not be good on Sundays or holidays. None of these tickets will be good on through rides which extend outside the first and second zones.

## Zone Fares Finally Win in Rhode Island

### Only Governor's Signature Needed to End a Long Controversy During which Legislature Fiddled While Company Faced Bankruptcy

The zone system of fares for the lines of the Rhode Island Company was approved on April 17 by the Rhode Island Senate. The vote was eighteen to seventeen. The plan already had passed the House. It is expected that Governor Beeckman will sign the bill within a few days.

Under the act the new system will take effect on May 1 unless the railway appeals to the Public Utilities Commission for more time to get ready.

#### A TWO-YEAR CONTROVERSY ENDED

The action of the Senate brings to an end a controversy of more than a year in the Legislature, and one of two years before the City Council of Providence. In its plans to the City Council the company said that it was facing bankruptcy and needed financial relief. The company asked that its franchise tax be reduced and that it be relieved from the obligation to pave certain streets. The city flatly refused to extend any aid.

A year ago the company went to the Assembly for relief. On the last day of the session a bill was passed creating a special commission of three to investigate and to act. This commission was told to determine an adequate fare system and to report to the Public Utilities Commission what it thought a good plan. The bill specifically ordered the Public Utilities Commission to follow the instructions of the special board.

The commission investigated. It delayed its report until the Assembly met. Then it sent to that body a report, recommending among other things a zone system. The Public Utilities Commission, as ordered under the law, told the Rhode Island Company to put the zone system into effect on April 1. At this point the Assembly stepped in, repealed the law of a year ago and specifically ordered that there be no change in fares until the Assembly said so.

#### HOW THE SYSTEM WILL BE APPLIED

The Assembly then named three Senators and four Representatives as a special committee to investigate the subject and look over the special report on the zone plan. This committee brought in a majority report favoring a 6-cent fare with eighteen tickets for \$1. There were two minority reports, one for the zone system signed by one man and another for State ownership signed by one man. The matter came up first in the House a week ago, and after a bitter debate, the minority report favoring zones was substituted for the majority report, and the act then passed. On April 17 the final touch was put to the bill in the Senate when it was passed in concurrence.

The zone system as ordered provides for a 5-cent zone in Providence, another at Pawtucket, one at Woonsocket, one

at East Providence and one at Riverpoint in the Pawtuxet Valley. Beyond these the territory is divided into so-called 2-cent zones. A 5-cent fare is a minimum charge anywhere, however. The transfer privilege in a 5-cent zone is extended to every patron riding into that zone.

It is estimated by the company and the commission that the new plan will increase the gross income of the company about \$500,000 each year.

#### Skip-Stopping a Habit

The world is "skip-stopping" to-day. For those who have learned the "hesitation," the "spiral sizz," "sheep dip" and the "Dowager's slump" and other forms of dansant de terpsichore, let it be understood at the outset that the "skip stop" is not a dance. It is a habit. It is the habit which motormen have of refusing to stop at certain crossings. It means cutting out useless stops by skipping stops here and there along the route of each line. Hours a day in time are saved thereby, according to traction heads. So when the motorman passes you up, do not hide a brick under your coat and wait for him to make the return trip. Just call it a "skip stop" and move up one block.—*Oakland Tribune*.

#### Reduced Rate Tickets Go

Withdrawal of Workingmen's Tickets Approved, but Needs Call for More Revenue Than This Will Bring

The Public Service Commission of Massachusetts issued a finding on April 16 approving the withdrawal of workingmen's reduced rate tickets on the Connecticut Valley Street Railway, Greenfield. One of the tickets, sold at the rate of fifty for \$1.80, is in effect between Greenfield and Turners Falls. The other is in effect between Turners Falls and Millers Falls and is sold at the rate of twenty-five for 90 cents. Both are good only between certain morning, noon and night hours. Both are two-part tickets and are intended for use only on journeys covering all or portions of two-fare zones. The unit cash fare throughout the system is 6 cents, but tickets good at all times and in any zone are sold at the rate of forty for \$2. The special workmen's tickets enable a ride to be secured for 7.2 cents which would cost 12 cents if cash were paid or 10 cents by using the ordinary form of ticket.

#### TICKETS MISUSED

The evidence showed that the separate halves of the workmen's tickets were misused to secure a ride for 3.6 cents within the limits of a single zone. The commission holds that the company could correct this abuse by proper precautions and the use of a suitable form

of ticket. About 25 per cent of the riders between Greenfield, Turners Falls and Millers Falls use these tickets. The maximum ride is about 7 miles.

The general financial condition of the company is poor. Little or no depreciation provision has been made and maintenance has been indifferent. No dividends were paid last year and the surplus was converted into a deficit. The commission finds that the reasonable need of the system as a whole calls for even more additional income than it can possibly obtain from the withdrawal of workingmen's tickets. The average annual receipts on all lines are about \$5,000 a mile; in the Greenfield division they approximate \$9,000. The workmen's tickets are of long standing, but present conditions are so abnormal as to prices and wages that their retention, in the board's opinion, is not justified.

#### The Truth About Mexico

Mexican Newspapers Give Details of So-Called Reduction in Fares in the Mexican City

Accounts now at hand from Mexican newspapers give the facts in regard to the reports widely published in the form of a dispatch to newspapers in the United States recently about a reduction in the fares on the lines of the Mexico Tramways. In order correctly to understand the situation the fact must be kept in mind that control of the tramways in Mexico City was taken over by the government at the end of 1914, and that the lines there have been operated by the government ever since.

On Oct. 27, 1917, the government official who has charge of the system received authority from the government to raise the fares, and on Nov. 1 the rates were accordingly increased in the case of city fares from 6 cents to 10 cents (Mexican currency) and in the case of suburban fares approximately 66½ per cent.

These increased fares have been in force since then. They are evidently the rates that were referred to in the press dispatches to the United States as being intended for reduction, for *Excelsior* of Feb. 22 said that the department of communications and public works had under consideration a new tariff for suburban tram fares, which would be much less than those then in force, and that it was probable that the old rates, namely, 10 cents, would be re-established. The paper said that this tariff referred only to the fares outside the city and "colonies." It said that others would continue as at present. In continuing *Excelsior* said at that time:

"The manager of the tramways has solicited from the department of communications the reduction in question, basing his argument on the fact that the jitney competition has reduced almost to one-half the number of passengers who formerly took the cars. The average number of passengers at present using the trams is 4,000,000 a month, the number having previously

been 8,000,000, and as fares were only increased 66 per cent, the present receipts are out of proportion to the revenue prior to the increase.

"We have been informed that the tramway company requested permission to increase the regulation speed in order that the public may give the railway cars preference over the jitneys, seeing that speed is one of the reasons why jitneys have had such a success, fares being in nearly all cases the same. This petition was not granted by the department of communications on account of the danger that would arise if trams were allowed to increase their speed, and those of the 'Agricultura' line, recently established, were ordered to reduce their speed.

"Engineer Rodriguez Gutiérrez, under secretary of communications, has presented to the President of the Republic the proposed new tariff, which, if approved, will be put in force in a few days."

### Six-Cent Fare in Jackson

The City Commission of Jackson, Mich., has granted a 6-cent fare in that city to the Michigan United Railways, operated under lease by the Michigan Railway. The new fare becomes operative April 24. The company showed that it could not make ends meet on a 5-cent fare under war conditions, after paying for operation, depreciation and taxes in 1917, the company had \$27,214 with which to pay \$97,693 of bond interest. In January and February the loss amounted to \$18,868, which if kept up for the year would produce a loss of \$113,208 for 1918.

The company conducted a publicity campaign through the local daily newspapers, running articles from day to day telling the facts.

Both the local daily newspapers, the *Citizen-Press* and the *Patriot*, endorsed the proposition editorially and published full and accurate news stories about it whenever there was occasion for publishing anything. The labor paper and another weekly also endorsed it. Labor unions, through their local federation, endorsed the proposed increase, and the employees of the company favored the raise.

There is a state commission in Michigan, but it has no jurisdiction in local utility rate matters, so that companies have to take their cases before the city councils.

### Railway to Run Busses

The Liberty Bus Motor Company has been organized at Austin, Tex., by the owners of the Austin Street Railway to install a motor bus line between the terminus of the city railway and Camp Mabry, 3 miles distant, at which a school will be established to train automobile and radio mechanics for the War Department. The company is capitalized at \$5,000. Among its incorporators is W. J. Jones, superintendent and general manager of the railway.

## Washington Approves Staggered Hours

### Government Department Heads and Others Indorse Suggestion—Principal Opposition Is From "Shop-Early" Advocates

Although it is too early to predict exactly what action will be taken on John A. Beeler's report (see *ELECTRIC RAILWAY JOURNAL* for April 6) recommending that the hours of government and other employees in Washington be staggered to relieve electric railway congestion, many favorable comments have been made on the proposition by men high in the conduct of government affairs. Copies of the report were sent to the heads of all large departments and to the principal business interests of the city, and this will be followed by general distribution as part of Senate Document 197.

All department heads so far heard from agree that some arrangement for staggering the hours must be made, although all are not agreed that the arrangement suggested for their particular department is the best possible. The most promising hope for the adoption of the program is the fact that both the Army and Navy agree heartily in all features of the report.

#### SECRETARY DANIELS IN THOROUGH ACCORD

For the Navy Department the report has had the personal attention of Secretary Daniels, and in a letter to the Public Utilities Commission he says:

"Referring to your letter of March 28, forwarding section four of the report of your expert, John A. Beeler, with reference to uniform opening and closing hours of the United States government departments and other large institutions, I am in thorough accord with the conclusions of your expert as to the changes suggested in the times of opening and closing various government departments."

#### WAR DEPARTMENT CONVINCED

Benedict Crowell, acting secretary of war during Secretary Baker's absence abroad, writes to the commission:

"The report has been examined with interest, and it seems to afford convincing argument as to the desirability of readjusting office hours in such a way as to afford relief from the street railway congestion. In the plan suggested in the report it is not proposed, as I understand it, to change the office hours of the War Department, and, of course, it would be greatly to the convenience of this department not to make a change, but if in the working out of this problem it seems desirable for this department to share in the adjustment, it would, of course, endeavor to do its part."

Major Arthur Williams of the committee of the Army and Navy appointed to study the subject says:

"The acting chief of engineers desires me to say that this office is very much pleased to find that you have been able to make suggestions which will reduce city railway congestion and to do it

along the lines which would be most acceptable to this office. I do not see how any branch of the Army or Navy can object to the propositions you make."

#### WAR TRADE BOARD READY

S. D. Maddock, director of Administration of the War Trade Board, says:

"I assure you that we shall be glad to co-operate in every way possible to accomplish the desired and much needed results."

This department has 1700 employees, and on account of a relocation of their office they "wonder if possibly you would not prefer to request even other changes than those stated in the proposed report."

#### CENSOR WANTS A FEW DAYS' NOTICE

The committee on public information, of which George Creel is chairman, replies to the commission.

"I beg to state that the committee will be glad to comply with this suggestion upon the request of your commission. We will be glad, however, to have a few days' notice in case a date is set for making these changes."

The replies quoted above are typical of those who approve the recommendations. Others are non-committal. A typical one of the few of this sort comes from Herbert Hoover, Food Administrator, as follows:

"I will be very pleased to co-operate with the Public Utilities Commission in relieving the congestion on the street railway lines; but in my opinion it is a little early to designate the opening and closing hours of the Food Administration in view of the fact that the number of our employees is so small in comparison with the number that will be employed in this neighborhood later on in the summer. Furthermore, the daylight saving bill, may automatically alter the hours of attendance, and I am anxious to see what result this change of one hour in the time will have upon our attendance here."

Several department heads are confused by the effect of the daylight saving bill on their working hours and have asked more time in which to consider the proposition. Others hold the opinion that their department is so small that they do not affect the railway load and should go their way unmolested. They fail to realize that the movements of each individual are what determines the volume of traffic.

In reply to such objections as this, the *Washington Times*, the local Hearst paper, carried an editorial on April 8, under the caption:

"Kicks Against the Beeler Suggestions. They are not fair, sporty, or patriotic, so let us all quit knocking and help the country win the war."

After full consideration of the facts presented at the public hearing on March 5 on the question of skip-stops



and at conferences with the railways the Public Utilities Commission of the District is of the opinion that the adoption of the recommendations in the report of its experts will result in reducing the existing congestion on the railway lines, make faster service possible, increase the carrying capacity of the present equipment of the companies, effect a considerable reduction in the consumption of coal and at the same time serve the greatest number of people using the cars with the least inconvenience.

In consequence the members of the district commission on April 10 issued an order that the stopping places for passengers on the railways in the district are to be those given in certain exhibits in the report on the Washington traction situation made by John A. Beeler except those in the Union Station Plaza, but that nothing contained in the order is to be construed to abolish or discontinue any of the so-called fire or emergency stops required under the regulations of the department of police of the district.

The order of the commission is to go into effect on Sunday, April 21.

### Mr. Taylor Makes More Appointments

A. Merritt Taylor, manager of passenger transportation of the Emergency Fleet Corporation, has made a number of appointments on the large staff he is creating to handle the problems of electric railway transportation to and from the shipyards of the country. These appointments except in the case of Mr. Welsh are in addition to those previously reported in the *ELECTRIC RAILWAY JOURNAL*.

G. T. Seely, assistant general manager of the Chicago Elevated Railways, has been named as assistant manager of passenger transportation.

The other staff appointments are as follows:

J. W. Welsh, electrical engineer and traffic agent for the Pittsburgh (Pa.) Railways.

M. W. Rew, chief engineer for the Pittsburgh Transit Commission, Pittsburgh, Pa.

C. F. Hewitt, private consulting engineer, Albany, N. Y.

D. C. Aincy, formerly assistant engineer with the Public Service Commission of Pennsylvania, Harrisburg, Pa.

C. G. Enz, formerly assistant chief clerk in the Department of City Transit, Philadelphia.

J. C. Thirlwall, electric railway engineer, General Electric Company, Schenectady, N. Y.

It is understood in Washington that some of the transportation difficulties of the ordnance department of the army, which were giving the government concern recently, are straightening themselves out, but that other problems may arise, in which case an arrangement has been made whereby the ordnance department will be allowed to call Mr. Taylor into consultation.

### Uniform Fare Recommended for Detroit

Engineers Propose Six-for-a-Quarter Tickets Without Transfers and Five-Cent Fare With Transfers

Six-for-a-quarter fares without transfers on all the lines of the city, together with various additions and improvements in service, form the basis of a proposed agreement between the city and the Detroit United Railway submitted on April 11 to the Street Railway Commission by Barclay Parsons & Klapp.

This would mean abolition of the franchises on the 3-cent lines and the eight-for-a-quarter tickets for working men, and the establishment of a definite status for all the lines, in place of the present variegated arrangement of franchise and non-franchise, 5-cent and 3-cent lines. Three-fourths of the car riders have been paying a 5-cent fare, while one-fourth have been enjoying a 3-cent fare. This is largely due to the fact that more than 38 per cent of the revenue passengers transfer from one line to another, paying 5 cents. The proposed plan would therefore equalize the fares over the city.

Improvement in service by the addition of 100 new trailer cars and 100 cars with motors capable of drawing trailers, discarding of the small cars now in use and substitution of larger ones, revision of schedules for regularity of intervals between cars, various reroutings in the down-town section and greater loading capacity should also be secured, in the opinion of the engineers.

The possibility of an excessive income from the new fare would be prevented by a fixed maximum which the company might receive, the surplus earnings being equally divided between the city and the company. The fare would be variable with the financial condition of the company, the Street Railway Commission or the Council establishing the fare.

The operating expenses of the company have increased 16.6 per cent since 1916, the survey found. This is the ground on which a return to the seven-for-a-quarter fare (given up in December, 1917) is deemed impossible. In addition, passenger traffic was found to be less by 13,000,000 during the first three months of this year than in the same period last year. Under the fares recommended about 60 per cent of the passengers would pay 4.16 cents, and 40 per cent 5 cents.

Investigation of street car delays showed that in two days in January interference by motor trucks and other vehicles caused seventy-nine delays, involving fifteen and a half hours of time. It is suggested by the engineers that the city regulate by ordinance the use of the car tracks by vehicles, especially in the rush hours, and that railroad crossing delays be reduced in the same manner. As a means of alleviating the home-bound rush, it is suggested that the big stores in the down-town section close at varying times.

### Relief for New Hampshire Company

Passenger and Freight Rates of Claremont Railway & Lighting Company Advanced

The Claremont Railway & Lighting Company, which operates passenger service from Claremont Junction to Claremont and from Claremont to West Claremont, N. H., a total distance of 6 miles, recently increased its passenger and freight rates.

The fares, previous to Nov. 1, 1917, between Claremont and either Claremont Junction or West Claremont, were 6 cents each. Books of twenty rides could be purchased for \$1, or at the rate of 5 cents per ride. Books containing twenty-five rides, good for workmen on certain cars only, could be purchased for \$1, or at the rate of 4 cents per ride. Books containing fifty rides, good for school children on school days and on certain cars, could be purchased for \$1.50, or at the rate of 3 cents per ride. The average is about 1000 passengers a day. This constitutes about 50 per cent of the company's revenue.

In addition to this, freight is hauled from the Boston & Maine Railroad station to manufacturing plants, all but two of which are located in Claremont. The average haul is less than 1 mile. The other two plants are located at West Claremont. The rate varies from 6 mills to 3½ cents per 100 lb.

After making an appeal to the Public Service Commission, there was a hearing and an investigation. The commission almost immediately gave permission to discontinue the sale of the 4 and 5 cent tickets.

The investigation of the freight situation brought out the fact that the railway owned practically all of the side tracks on the shippers premises. These varied in cost all the way from \$400, for one shipper to \$15,000 for another, all of which the company had to maintain and keep free from snow.

On account of the very complicated system of handling freight, side tracks, etc., the commission was unable to render a decision for some time. On March 9, 1918, that body granted a temporary increase of 20 per cent on freight rates, to be in effect until such time as the investigation was completed and the permanent rate fixed.

Since this date, the commission has recommended that all shippers either purchase or lease from the railway the side tracks and facilities used for their particular benefit and further that the shipper maintain these tracks in repair and keep the snow removed from same.

If these tracks are purchased, this should give the company about \$23,000 in ready cash; if leased, about \$4,000 a year. The maintenance of these tracks and the removal of snow and ice should relieve the company of an expense amounting approximately to \$2,500 a year.

The final decision as to rates is expected about May 1.



## Transportation News Notes

**Six-Cent Tariff Suspended.**—The Public Utilities Commission of Illinois has suspended until July 29 the proposed new tariff of the Rockford City Traction Company, increasing its cash fare from 5 cents to 6 cents and abolishing certain concessions on tickets.

**Other Fare Increases in Scranton.**—Notice of a fare increase to 6 cents in the city has been filed with the Public Service Commission of Pennsylvania at Harrisburg, Pa., by the Scranton & Binghamton Railroad and the Scranton & Binghamton Traction Company.

**Accident in Chicago Suburbs.**—Two passengers were killed and more than twenty injured on April 14 when a Chicago & West Town Railway car was demolished by a fast freight on the Indiana Harbor Belt Line railroad in the outskirts of La Grange.

**Advertising Campaign in Dallas.**—The Dallas (Tex.) Railway is entering on a campaign of publicity, in which newspaper advertising is being used, with the object of educating the public to a fuller realization of the benefits to be derived from the service furnished by the company.

**Buffalo Jitney Measure Passed.**—The Council of Buffalo, N. Y., has adopted the jitney bus ordinance proposed by Mayor Buck. It provides for a license fee of \$15 for a car of five passengers and \$3 for every additional passenger. When application is made for a license, the applicant must state over what routes it is proposed to operate the jitneys.

**Time for Meeting Schedule Order Extended.**—The Brooklyn (N. Y.) Rapid Transit Company has been granted an extension of time until April 29 in which to comply with the order of the Public Service Commission for the First District in regard to the posting of schedule and other data in cars. The order of the commission was referred to in the *ELECTRIC RAILWAY JOURNAL* for March 9, page 481.

**New Kansas City Folder.**—The Kansas City (Mo.) Railways has published "Where to Go in Kansas City," a folder of easy trips from the Union Station by street car, showing where to go and what to see in Kansas City, with a map and guide of the lines of the company. The company says: "It is the aim and purpose of the management to give Safety and Service to its patrons. Helpful criticism is welcomed."

**Monongahela Company Raises Fares.**—The Monongahela Valley Traction Company, Fairmont, W. Va., on April 1 advanced its fares on the lines in the interurban zones in the territory

at Fairmont. The rate is raised from 5 to 6 cents for each zone, which from Fairmont to Clarksburg advances the fare from 55 cents to 65 cents. This does not include the war tax. The rate in the city limits remains unchanged.

**Fare Increase Denied.**—The Public Service Commission of Indiana has denied the petition of the Ohio Electric Railway for a raise of mileage rates in Indiana from 2 to 2½ cents a mile. The company operates between the Ohio-Indiana State line and Fort Wayne, a distance of about 23 miles. Denial of the petition is appended with the statement that should the company change its service or provide better facilities the petition will be reviewed by the commission.

**City May Run Jitney Line.**—Mayor Baker, of Portland, Ore., has instructed City Commissioner Mann of the department of public utilities, to make plans for a line of municipal jitneys to Linnton. The former town of Linnton is without electric railway connections with Portland, and the present jitney service furnished by Stephen Carver has been the subject of much complaint by citizens of the suburb. It is stated that Mr. Carver will relinquish his Linnton franchise without contest.

**Revising Cincinnati Skip Stops.**—W. C. Culkins, Director of Street Railways, of Cincinnati, Ohio, announced recently that the skip-stop plan in use by the Cincinnati Traction Company for some time had not proved as satisfactory in saving time as had been anticipated. Mr. Culkins said that some changes will be made in the system which should result in material improvement. If skip stops can finally be worked out to advantage, they will be retained permanently.

**Reading Far Hearing Awaits City Action.**—The continuation of the hearings before the Public Service Commission of Pennsylvania with respect to the increase in fares put into effect by the Reading Transit & Light Company on Jan. 10 is awaiting the report of the city engineer of Reading, who is engaged in checking up the testimony presented by the company at the first hearing, on Feb. 8, reviewed in the *ELECTRIC RAILWAY JOURNAL* of March 2, page 435.

**Extension of Skip Stop in Indianapolis.**—The Board of Public Works of Indianapolis, Ind., ordered a trial of the skip-stop plan of operation on two of the main trunk lines of the Indianapolis Traction & Terminal Company to be put into effect on March 17. The improvement in the service and general satisfaction of the patrons of the lines affected has led to a further order of the board, which has just been issued, extending skip-stop operation to two additional trunk lines, effective on April 14.

**Soldiers Must Pay.**—The Public Utilities Commission of Illinois has decided that all soldiers and sailors must pay the regular fare of 2 cents a mile. This decision follows the filing of a petition

providing that soldiers and sailors should only pay 1 cent a mile while traveling in uniform. The commission announced in the decision that it had no power under the law to discriminate in favor of soldiers and sailors and that there was no way in which the commission could grant uniformed men this privilege.

**Street Car Talks in Saginaw.**—In connection with its publicity campaign for a 6-cent fare the Saginaw-Bay City Railway, Saginaw, Mich., has published a booklet of talks, reproducing material previously used in its newspaper advertisements. The talks emphasize the effect of fares on service, the need of utility preservation, the higher costs, and the relief granted elsewhere. The booklets are placed in the "Take One" boxes in the cars. As soon as further talks have been printed in the daily press, another booklet will be published.

**Special New Jersey Session Vetoed.**—Governor Edge of New Jersey on April 12 denied the request of George L. Record, Jersey City, assistant counsel for the New Jersey League of Municipalities in the fight against the Public Service Railway Company's proposed increased fares and transfer charges, for the calling of a special session of the Legislature to enact legislation nullifying a recent decision of the New Jersey Supreme Court that contracts made between public utilities and municipalities are repealable by the State Board of Public Utility Commissioners.

**Increase Authorized for Municipal Line.**—The Board of Railway Commissioners of Canada has authorized the London & Port Stanley Railway, London, Ont., to increase its standard passenger tariff by 15 per cent and its freight rate on coal by 15 cents per ton. The increases are granted, the judgment states, because "it is clear that the company's rates are insufficient properly to cover the costs of operation under the conditions to-day." The London & Port Stanley Railway is operated for the city of London by a commission of which Sir Adam Beck is chairman. The road is 38 miles long and operates cars in trains.

**Testimony Presented in Fare Case.**—Taking of testimony on the application of the New Jersey & Pennsylvania Traction Company for authority to increase fares was completed before Utility Commissioner Slocum on April 16. The company wants to increase the fare in each of its zones between Trenton and Princeton from 5 cents to 6 cents. Frank S. Katzenbach, Jr., appeared for the company. The city of Trenton was represented by City Counsel Charles E. Bird and George L. Record. Counsel for Trenton will go over the testimony presented in behalf of the company and if there is reason for cross-examination witnesses will be recalled for this purpose. The company was recently granted permission by the Public Service Commission of Pennsylvania to increase its fares from 5 cents to 6 cents on the Pennsylvania division.

## Personal Mention

W. H. Evans has been appointed electrical engineer of the Tidewater Southern Railway, with offices at Stockton, Cal.

George B. Schaeffer, Reading, Pa., has been elected president of the Allentown & Reading Traction Company, Allentown, Pa., to succeed the late Howard E. Ahrens.

Walter D. Whitney, superintendent of electrical construction of the Twin City Rapid Transit Company, Minneapolis, Minn., has had his duties enlarged to cover the underground conduit and cable systems. Mr. Whitney was born in Gloversville, N. Y., on Jan. 25, 1878. He was graduated from high school in 1898 and from the electrical engineer-

In his new position he succeeds Lieut. Robert F. Scott, Jr., who is now in France in the railway transportation division of the American Expeditionary Forces.

J. G. Miller, manager of the Manitowoc & Northern Traction Company, Manitowoc, Wis., has received orders to report to the president of the Baltimore Dry Dock & Shipbuilding Company, Baltimore, Md., for special duty in connection with the government work there. The company at Baltimore is controlled by the Clement C. Smith interests, which operate the Manitowoc property.

J. C. Thirlwall, has resigned from the railway and traction engineering department of the General Electric Company, to accept a position with A. Merritt Taylor, in the passenger transportation department of the Emergency Fleet Corporation. Mr. Thirlwall is unusually well equipped for this work because of his operating and manufacturing experience and his progressive ideas. The latter have been set forth by him in various technical discussions, particularly in his article entitled "Operation of Frequent Service Cars in Large Cities" published in the September 22, 1917, "More Service at Less Cost" issue of the ELECTRIC RAILWAY JOURNAL. Mr. Thirlwall joined the staff of the General Electric Company in 1912 after serving for nine years in the mechanical department of the Brooklyn (N. Y.) Rapid Transit System, the last three years in charge of one of the elevated maintenance shops.

C. W. Squier has resigned as assistant electrical engineer of the Public Service Commission for the First District of New York, to become a member of the editorial staff of the ELECTRIC RAILWAY JOURNAL. Mr. Squier has been a frequent contributor to the columns of this paper in the past, his articles including a series on car equipment defects during 1916-1917 and the series of articles on car equipment, now being published in the monthly "Mechanical Issues" of the ELECTRIC RAILWAY JOURNAL. Mr. Squier was graduated from the University of Michigan in 1898. For four years he was with the General Electric Company as designer of control apparatus, later becoming head designer of multiple-unit train control of the company. He was also connected with the Sprague Electric Company as designing engineer at the time that this company was the pioneer in multiple-unit control apparatus. In 1904 he went to England and was electrical engineer on railway apparatus for the British Westinghouse Electric & Manufacturing Company, and while there designed that company's type "T" line of railway controllers which has since remained stand-

ard for tramway work. Mr. Squier returned to this country and entered the Pittsburgh works of the Westinghouse Company at the time the first New Haven single-phase locomotive was introduced. He followed the testing and equipping of these locomotives as engineer. In 1908 he became engineer for the mechanical department of the Brooklyn Rapid Transit System and remained with that company for eight years or until he went with the New York Public Service Commission, two years ago.

T. C. Ruhling, superintendent of underground construction work of the Twin City Rapid Transit Company, Minneapolis, Minn., since May, 1905, resigned from the company on April 15 to accept the position of superintendent of distribution of the Kansas City Light & Power Company, Kansas City, Mo. Mr. Ruhling was born in New York City on Aug. 8, 1875. He was connected with the National Conduit & Cable Company on construction work



W. D. WHITNEY

ing department of Cornell University in 1902. He worked in the shops, testing department and instrument department of the General Electric company at Pittsfield, Mass., from 1902 to 1904, and entered the service of the Twin City Rapid Transit Company on Jan. 7, 1904, on car testing work. He was appointed superintendent of electrical construction of the company in charge of electrical construction work in the power houses and substations on Oct. 1, 1906.

Walter L. Cheney, nominated by Governor Whitman of New York for appointment to the Public Service Commission of the Second District of New York, has been confirmed by the Senate. Mr. Cheney succeeds the late William Temple Emmett.

William D. Wallace has been appointed engineer of maintenance of the Terre Haute Division of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind. Mr. Wallace was graduated from Rose Polytechnic Institute of Terre Haute, and has been connected with the company for a number of years as engineer in the lighting and power department.



T. C. RUHLING

in 1897 and 1898 and was with the Bell Telephone Company, New York City, in 1899 on construction work. He served with the National Conduit & Cable Company on underground construction work from 1900 to the spring of 1905, when he entered the service of the Twin City Rapid Transit Company.

## Obituary

John Brown Whelan, disciplinary officer of the Detroit (Mich.) United Railway, died on March 9.

Howard E. Ahrens, president of the Allentown & Reading Traction Company, Allentown, Pa., is dead.

Fred S. Parker, general manager for the Brainerd (Minn.) Street Railway, is dead. Mr. Parker was born in Milwaukee, Wis., sixty years ago. He was at one time an engineer for the Great Northern Railroad.

Capt. Henry N. Brooks, whose death in France of pneumonia has just been announced, was a member of the United States Engineers' Reserve Corps. Captain Brooks was an electrical engineer with James N. Hatch, consulting engineer, Chicago, Ill., at the time of enlisting. He went to France last December, and was stationed in a small village as engineer, depot officer, in charge of a large engineer supply depot for the American army. He was a graduate of the engineering college of Cornell University in the class of 1888, and was one of the pioneers in the electrical railway engineering field. One of his first undertakings was as an electrical engineer on the electrification of the car lines in Philadelphia in 1892 and 1893. During his career he also operated an electric railway property in Florida, and was at one time employed in electric railway work by the Westinghouse Electric & Manufacturing Company. He afterward had charge of the construction of the interurban line from Grand Haven to Grand Rapids, Mich. He was for eight years electrical engineer for the firm of Sargent & Lundy, Chicago. He had been with James N. Hatch for two years prior to his enlistment in the army last June. Mr. Brooks' father was the late Admiral William B. Brooks, United States Navy. His brother, Col. John C. W. Brooks, was retired from the army a few years ago, and is now professor of military tactics at the Canadian Institute.

Charles W. Wason, widely known in interurban railway circles, died at his home in Cleveland, Ohio, on April 15. He had not been well since his retirement from business about ten years ago. Mr. Wason was born in Cleveland on April 30, 1854. He was graduated from Cornell University in 1872, and in 1887 he entered the employ of the East Cleveland Railway Company as electrical engineer and purchasing agent, positions which he held for five years. Having established a reputation in railway work, Mr. Wason had no trouble in organizing a company to build the first section of an interurban road with which he hoped to connect Cleveland and Buffalo. This is known as the Cleveland, Painesville & Eastern Traction Company, of which he served as president for many years. In 1896 he was elected president of the Northern Ohio Traction & Light Company and under his administration the Cleveland-Akron division made rapid strides. Later he became a director of the Cleveland Railway, Detroit (Mich.), United Railway and the London (Ont.) Street Railway. Mr. Wason retained his interests in electric railways, but turned his attention to independent telephone development and became a director of the United States Telephone Company, the Cuyahoga Telephone Company and the Federal system. He is survived by his widow and two daughters, Mrs. Harold S. Edwards, Dedham, Mass., and Mrs. John A. Rithet, Victoria, B. C.

## Construction News

Construction News Notes are Classified under each heading alphabetically by States. An asterisk (\*) indicates a project not previously reported.

### Franchises

**Bellaire, Ohio.**—The Wheeling (W. Va.) Traction Company is operating in Bellaire, Ohio, without a franchise pending the renewal of the grant which expired on March 28.

### Track and Roadway

**Pacific Electric Railway, Los Angeles, Cal.**—The Board of Public Utilities has ordered the Pacific Electric Railway immediately to double-track its line between Wilmington and Long Beach.

**Union Traction Company, Coffeyville, Kan.**—It is reported that the Union Traction Company will not construct its proposed extension from Collinsville to Nowata at present, owing to scarcity of labor and material.

**\*Wichita, Kan.**—John Madden and W. I. Funk are reported interested in the construction of a new interurban line from Wichita to Arkansas City, via Derby, Mulvane, Belleplaine and Winfield.

**Interborough Rapid Transit Company, New York, N. Y.**—By direction of the Public Service Commission for the First District, the Interborough Rapid Transit Company placed the last section of the Jerome Avenue elevated branch of the Lexington Avenue subway in operation on April 15. On June 2, 1917, service over this line was begun between 149th Street and Kingsbridge road. Operation between the latter point and the northern terminus of the line was retarded owing to the non-completion of Interborough power house substations.

**Southern Public Utilities Company, Charlotte, N. C.**—Considerable reconstruction work will be done by the Southern Public Utilities Company in Winston-Salem.

**Public Service Railway, Newark, N. J.**—This company through the United States Shipping Board, on account of the Submarine Boat Corporation, Port Newark Terminal, N. J., will construct a two mile, double-track extension in Hamburg Place, on a private way, and Avenue R to Port Street, the Corporation's shipyards. The franchise has been applied for as noted in last week's ELECTRIC RAILWAY JOURNAL, and the contract for the construction, which will include 4000 ft. of trestle,

was let this week, and is to be pushed to completion in ninety days.

**City Railway, Dayton, Ohio.**—This company reports that it expects to renew about 5000 ft. of track and paving this year.

**Hocking-Sunday Creek Traction Company, Nelsonville, Ohio.**—This company reports that it expects to construct about 1 mile of track this summer.

**Texas Electric Railway, Dallas, Tex.**—The City Commission of Dallas, Tex., has rescinded the contract that was entered into several months ago with the Texas Electric Railway providing for the construction of two interurban electric railways out of Dallas, as a part consideration of the granting of a new franchise to the company. The proposed lines were each to be not less than 30 miles long and their cost was estimated at about \$2,000,000. The existing war situation and the inability of the company to obtain construction material are given as the causes for the rescinding of the contract.

**Seattle (Wash.) Municipal Railway.**—On April 12 the Board of Public Works, Seattle, Wash., opened bids for construction of the trestle portion of Seattle's Municipal Street Railway from First Avenue South and Washington Street to Railroad Avenue; South on Railroad Avenue south and Whatcom Avenue to Walker Street, a total distance of 1½ miles. The low bid for the work and furnishing materials was submitted by D. W. Rutherford, Tacoma, at \$42,262. Lester Monahan, Seattle, bid \$61,204. The contract will be awarded on April 19 and will undoubtedly go to D. W. Rutherford. The job entails the placing of 78,000 lin.ft. of fir piling and 652,000 ft. of lumber. Bids for laying ties, track and overhead construction will be called for by the Board of Public Works, C. B. Bagley, chairman, at an early date.

### Power Houses and Substations

**Havana Electric Railway, Light & Power Company, Havana, Cuba.**—This company has placed contracts for railway substations equipment consisting of two 2000 kw. rotary converters, 6 phase, 60 cycles, 450 r.p.m., with six 750 kva. single phase oil insulated self-cooled transformers, 13,200 volts to rotary voltage, and switch and control equipment. The awards were made to the Westinghouse Electric & Manufacturing Company through the Westinghouse Electric Export Company.

# Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

## Rolling Stock Buying Active

Orders and Specification Inquiries for New Cars More Plentiful—Enlarged and Improved Equipment

Car builders have not complained so much about the lack of orders as the manufacturers and sales agents of supplies and accessories. Government requirements have superseded in a dominating measure the regular business in the various lines of the railway industry with the car manufacturers, who, in many instances, have almost turned over their entire plants to that work. It has become manifest, however, to repeat the remarks of a number of supply men, that the traction roads were not only a necessary and essential factor in the social, financial, commercial and industrial life of the nation, but their maintenance at the highest efficiency should receive the attention due its importance.

For a long time this supreme factor seems to have been lost sight of, not only by government officials, who are directing, if not controlling, about everything, but by the public and the traction companies themselves. Of the many attempts to have fares increased all over the country it is not required to mention here. The question has received adequate treatment elsewhere and frequently. The point made in this department of the *ELECTRIC RAILWAY JOURNAL* is that in not a few instances electric railway properties have been called upon to provide enlarged transportation facilities to meet the demands of extra travel wherever cantonments, aviation fields, naval bases and other military requirements existed.

Urban and interurban traffic has also greatly increased and the railways have endeavored to make their old equipment answer. Every means have been taken to keep the rolling stock, trackage, power house, transmission lines, shops, etc., in a fair condition to meet the emergency; but, it is obvious that material will deteriorate—it cannot last forever. The deplorable condition of not a few systems have been openly criticised, and in other cases commissions have issued instructions to provide more service. The result has been that the owners and managers of not a few public utilities are coming into the market for new cars and equipment, despite the high cost and other drawbacks of a like nature. It will be noticed in the "Rolling Stock" department of the *ELECTRIC RAILWAY JOURNAL* that the record, beyond a doubt, proves this a fact.

The Western railways were the first to appear and place orders with the car builders, and now many Eastern

companies are either buyers or making preparations with that end in view. Several important negotiations of this character are about closed or under consideration. Possibly others, whose needs cannot be longer ignored, will make known their requirements in the near future. At any rate, the car builders are in a position to fill orders on a shorter delivery than for some time, if desired, with a possibility of a still further improvement.

## Snowplow Equipment Is Now in Order

Higher Prices Prevail for the Approaching Season—Deliveries and Material Are Uncertain

Along about this time of the year snowplow equipment for the fall and winter come up for consideration by the electric railways. When the representative of a leading manufacturer was questioned upon the matter he said the snowplow business was just starting. That is to say, the superintendents of the track and car equipment departments and the purchasing agents, while not exactly in the market to place orders, were nevertheless giving it some attention.

Prices would, of course, be much higher than in 1917, as might be expected with current metal conditions.

TABLE II—SHOWING PERCENTAGES OF PRESENT FULL TIME OUTPUT (BITUMINOUS MINES)

Week Ended	February 23	March 2	March 9	March 16	March 23	March 30
Produced.....	68.3	70.7	70.6	66.8	69.3	66.2
Cost from all causes.....	31.7	29.3	29.4	33.2	30.7	33.8
Cost on account of car shortage.....	22.3	21.1	21.2	22.9	20.6	23.3
Labor shortage or strikes.....	3.9	2.6	2.1	2.2	2.3	2.6
Mine disability.....	4.0	3.6	3.2	3.9	3.4	2.8
No market.....	0.6	0.9	1.7	2.3	2.8	2.9
All other causes.....	0.9	1.1	1.2	1.9	1.6	2.2

Deliveries will also be later than last year, the difficulty so far being whether the raw material could be obtained when needed. The sooner the order was given the more certainty there was of getting the plows before it was necessary to put them in commission for the winter's activities.

If the buying is deferred until June or July the equipment will be harder to secure in time. Shipments from the factory were usually made in September or early in October, and therefore it would be advisable to give the ordering prompt attention at the present time. As stated above, the manufacturer in mind very emphatically remarked that prices have gone far beyond those of 1917 and may go higher—no one could tell for a certainty what the quotations may be in the course

## Less Production of Coal

Shortage of Cars Available for Transporting Coal Is Principal Cause Just Now

A decrease of 1,500,000 tons or 14 per cent as compared with the preceding week marked the total output of bituminous coal during the week ended April 6, according to the last bulletin of the United States Geological Survey. The total production of bituminous coal (including lignite and coal made into coke) is estimated at 9,395,000 net tons. It is difficult to determine the rate of production per working day because of the unequal observance of Mitchell Day, April 1 (anniversary of enactment of eight-hour law,) as a holiday. Comparison of the production of Monday, April 1, of sixteen roads reporting 10 per cent of loading, with the average of the two Mondays previous thereto and Monday, April 8, indicate that Mitchell Day was

TABLE I—ESTIMATED UNITED STATES PRODUCTION OF BITUMINOUS COAL AND OF BEEHIVE COKE

Week Ended	Total Bituminous, Including Coal Coked	Average per Working Day	Beehive Coke (At the Mines)	Average per Working Day
Mar. 23.....	10,998,000	1,833,000	665,000	111,000
Mar. 30 (a)...	10,894,000	1,816,000	649,000	108,000
Apr. 6 (b)...	9,395,000	1,566,000	624,000	104,000

(a) Revised from last report. (b) Subject to revision.

equivalent to 0.4 of the regular working day.

The total production of beehive coke is estimated at 624,000 net tons, about 4 per cent decrease. The average per working day is estimated at 104,000 compared with 108,000 for the week previous.

Anthracite shipments decreased from 43,642 cars for the week of March 30 to 32,232 cars.

Table II shows the percentage of full time output produced and lost by all bituminous operators making weekly reports to the government.

of the next few months. Even at that material is not always available, and to be on the safe side the managers of traction roads accept a hazard unless they are wise enough to anticipate their requirements.



## Temperamental Workmen at Wire Plants Troublesome

Skilled Operatives Have Peculiarities as Specialists and Have a Constant Tendency to Shift.

Besides the difficulty of obtaining early or prompt delivery of copper to the wire drawers and manufacturers, labor at these plants is not only short but at times creates embarrassing conditions. One large wire producer said the major part of the labor force were foreigners—Poles in many instances. They are skilled men, excellent artisans, but inclined to be "temperamental." The practice at this and other plants is to use the working operatives to the best advantage.

Occasionally the supply of bare copper wire runs low, and replenishment cannot always be accomplished now readily and promptly. At such periods the management shifts these men to other departments and on different tasks. This is resented. The workers prefer to follow one particular line in which they are proficient and skilled. Consequently when a shift is made to conserve time and material these workmen not infrequently "throw up" their jobs and leave for other wire plants where perhaps their specialty may be followed. The absence is usually brief, for the same procedure brings the easily ruffled workman back to his original place of employment and temporary contentment. It is said that there is continually a round of changes on this account. While this break in the plant's working personnel is a source of annoyance, the frequent holidays—mostly of a religious character—also upset the smooth running of the factory and cut down the output. One day is not sufficient to attend to these duties, but two are usually the rule and not the exception.

## Fuel and Raw Material for Preferential Industries

Under the title of Preference List No. 1 the War Industries Board of the Council of National Defense, on April 10 announced that the Priorities Board had selected the industries whose operation is of exceptional importance. This is measured by the extent of their direct or indirect contribution either toward winning the war or promoting the national welfare. Therefore these industries, about forty odd in number, will be accorded preferential treatment in the distribution of fuel and in the transportation of raw materials and supplies required by them in their manufacturing operations, so that they may not be delayed or hampered in complying with priority orders issued against them governing their products.

Preference List No. 1 is not complete in itself, but provision is made for certifying additional classes of industries and also additional plants whose operations are necessary as a war measure. In the electrical field the following are listed: Plants manufacturing electrical equipment; railways; plants manufacturing locomotives,

freight cars and rails, and other plants engaged exclusively in the manufacture of railway supplies; plants manufacturing machine tools; public utilities; plants printing and publishing exclusively newspapers and periodicals.

In its official order the Priorities Board states it had not undertaken to classify any industry as non-essential.

## Rolling Stock

Spokane & Inland Empire Railroad, Spokane, Wash., is reported as converting four of its two-man cars to the one-man type in its own shops. The cost is approximately \$800 a car.

Dayton, Covington & Piqua Traction Company, West Milton, Ohio, has recently placed an order with the Cincinnati Car Company for two new inter-urban cars. They consist of three compartments—baggage, smoker and passenger; are 50 ft. in length, center-entrance type and will be completed by April 20 (to-day). Taylor trucks are used, Westinghouse H. L. control and No. 532 motors. The company also expects to purchase one freight trailer within the next sixty days.

International Railway, Buffalo, N. Y., as noted in last week's *ELECTRIC RAILWAY JOURNAL*, has ordered thirty new cars of the G. C. Kuhlman Car Company, the specifications of which follow:

Number of cars ordered.....	30
Name of road.....	International Railway Co.
Date order was placed.....	Jan. 28, 1918
Date of delivery.....	April 1, 1918
Builder of car body.....	G. C. Kuhlman Car Co.
Type of car.....	Witt
Seating capacity.....	Approximately 54
Weight.....	35,640 lb. (estimated)
Bolster centers, length.....	25 ft. 6 in.
Length over bumpers.....	50 ft. 1/4 in.
Length over vestibule.....	49 ft. 2 1/2 in.
Width over all.....	8 ft. 4 in.
Height, rail to trolley base.....	10 ft. 8 1/2 in.
Body.....	Semi-steel
Interior trim.....	Natural cherry
Headlining.....	Nevasplit
Roof.....	Plain arch
Air brakes.....	Westinghouse
Axles.....	Brill
Bumpers.....	Rico anti-climber
Car trimmings.....	Polished brass
Control, type.....	West K-12 A (with contactors)
Couplers.....	Portable type
Curtain fixtures.....	Curtain Supply Co.
Curtain material.....	Pantasote
Designation signs.....	Hunter
Door operating mechanism.....	National Pneumatic Co.
Fare boxes.....	Railway Company
Fenders or wheelguards.....	H. B. type
Gears and pinions.....	Railway Company
Hand brakes.....	Peacock
Heaters.....	Peter Smith forced ventilation
Headlights.....	Golden Glow G. M. 95
Journal boxes.....	Brill
Lightning arresters.....	Railway company
Motors, type and number.....	Westinghouse 506-A-2, four per car
Motors.....	Inside hung
Paint, varnish or enamel.....	Wright's inside varnish Kay & Ess outside varnish
Acme White Lead & Color Works' paint Registers.....	Railway company
Sanders.....	Nichols-Lintern trap
Sash fixtures.....	Brill
Seats, style.....	Brill type
Seating material.....	Rattan
Springs.....	Brill (for seats)
Step treads.....	Feralun
Trolley catchers or retrievers.....	Earl No. 10
Trolley base.....	Railway Co.
Trolley wheels or shoes.....	Railway Company
Trucks, type.....	Brill 77-E I
Ventilators.....	Nichols-Lintern
Wheels (type and size).....	26 in. cast iron

Hocking-Sunday Creek Traction Company, Nelsonville, Ohio, has put in service two new passenger cars.

Lake Shore Electric Railway, Cleveland, Ohio, on Monday, had six inter-urban cars destroyed by fire in the company's carhouse at Beach Park, Ohio. Three of the cars were practically new and valued at \$14,000 each. The loss is about \$72,000.

Boston (Mass.) Elevated Railway, had ninety-four cars and one sprinkler car, owned by an outside concern, destroyed by a fire April 7. The westerly section of the Clarendon Hill car house of the company, in Somerville, was also burned. It is not expected that the company will purchase any new passenger equipment at present to replace that lost, but it will probably be in the market in the near future for snow plows.

Hudson & Manhattan Railroad, New York, N. Y., operating the Hudson River tubes and subway lines in New York and New Jersey, has the proposition of an extension to the Port Newark Terminal shipyards and the purchase of 100 cars still held in abeyance by the United States Shipping Board. The plan and purpose has been favorably recommended by the officials who made the survey.

Capital Traction Company, Washington, D. C., as reported in the *ELECTRIC RAILWAY JOURNAL* of March 16, ordered twenty new cars of the G. C. Kuhlman Company, delivery in July, the specifications of which are as follows:

Numbers of cars ordered.....	20
Name of road.....	The Capital Traction Company
Date order was placed.....	March 11, 1918
Date of delivery.....	July, 1918
Builder of car body.....	G. C. Kuhlman Car Co.
Type of car.....	Semi-convertible prepayment
Seating capacity.....	48
Weight (total).....	40,000 lb. (approximate)
Bolster centers, length.....	20 ft. 2 1/2 in.
Length over bumpers.....	43 ft. 11 1/2 in.
Length over vestibule.....	42 ft. 11 1/2 in.
Width over all.....	8 ft. 6 in.
Height, rail to trolley base.....	11 ft. 8 in.
Body.....	Wood structure, composite underfront
Interior trim.....	Cherry-mahogany finish
Headlining.....	Agasote
Roof.....	Monitor
Air brakes.....	Westinghouse Traction Brake Co.
Axles.....	Brill
Bumpers.....	Brill
Car trimmings.....	G. C. Kuhlman Car Co.
Control, type.....	GE N-35 with two contactors
Couplers.....	Tomlinson Automatic (O. B. Co.)
Curtain fixtures.....	Curtain Supply Co., Rex rollers
Curtain material.....	Pantasote
Designation signs.....	Hunter Illuminated
Door operating mechanism.....	National Pneumatic Co.
Fenders or wheelguards.....	Parmenter
Hand brakes.....	Peacock
Heaters.....	Peter Smith single coil electric
Headlights.....	Electric Service Supplies 4-M-96
Journal boxes.....	Brill
Lightning arresters.....	General Electric
Motors, type and number.....	4 GE-247, inside hung
Paint, varnish or enamel.....	C. V. E. seven-day system
Registers.....	International R-5
Sanders.....	Keystone air sanders
Sash fixtures.....	Edwards
Seats, style.....	Brill "Winner"
Seating material.....	Cane
Step treads.....	Kass safety treads
Trucks, type.....	Brill 77 E-1
Ventilators.....	Deck sash openers
Wheels (type and size).....	30-in. cast chilled
Special devices, etc.....	Cars to be arranged and equipped for train operation



Washington Railway & Electric Company, Washington, D. C., placed an order for twenty-five cars, delivery June and July, with the G. C. Kuhlman Car Company, reported in last week's ELECTRIC RAILWAY JOURNAL, the specifications of which are appended:

Number of cars ordered.....	25
Name of road.....	Washington Railway & Electric Co.
Date order was placed.....	March 29, 1918
Date of delivery.....	June and July, 1918
Builder of car body.....	G. C. Kuhlman Car Co.
Type of car.....	30-ft. 11½ in. Prepayment body
Seating capacity.....	48
Weight (total).....	40,000 lb.
Bolster centers, length.....	20 ft. 2½ in.
Length over bumpers.....	43 ft. 11½ in.
Length over vestibule.....	42 ft. 11½ in.
Width over all.....	8 ft. 6 in.
Height, rail to trolley base.....	12 ft. 0 in.
Body.....	Wood
Interior trim.....	Cherry
Headlining.....	Agasote
Roof, arch or monitor.....	Monitor
Air brakes.....	Westinghouse
Axles.....	A.E.R.A.-E-5 3½ in. x 7 in. Journal
Bumpers.....	Brill channel
Car trimmings.....	Bronze
Control, type.....	K-35-General Electric
Couplers.....	Tomlinson automatic (Ohio Brass Co.)
Curtain fixtures.....	Forsythe No. 88
Curtain material.....	Pantasote
Designation signs.....	Hunter (Electric Service Supplies Co.)
Door operating mechanism.....	National Pneumatic
Wheelguards.....	Parmenter
Gears and pinions.....	G. E.
Hand brakes.....	Peacock
Heaters.....	Peter Smith Electric
Headlights.....	Golden Glow type RM-96
Journal boxes.....	Brill
Lightning arresters.....	G. E.
Motors.....	4-GE-200-K, inside hung
Paint, varnish or enamel.....	ChicagoVarnish Co.
Registers.....	International R-5
Sanders.....	Ohio Brass air
Sash fixtures.....	Edwards
Seats, style.....	Reversible
Seating material.....	Rattan
Springs.....	Brill
Step treads.....	Mason
Trolley base.....	G. E.
Trolley wheels or shoes.....	G. E.
Trucks, type.....	Brill No. 76 12 I trucks
Wheels (type and size).....	30 in. cast iron

Public Service Railway, Newark, N. J., to furnish rolling stock for its new 12-mile extension, now under way, to the shipyards of the Submarine Boat Corporation at Port Newark Terminal, has ordered eighteen new passenger cars of standard type, of the Cincinnati Car Company. As the entire equipment and work is financed by the United States Shipping Board, the delivery will be in ninety days on a priority order. The company has also been consulted about furnishing additional cars for its Camden lines running to the shipyards on the Delaware River. About forty-six new cars would be required, and the expenditure in the neighborhood of \$1,500,000. As the company now leases all its surplus energy to the shipyards a new power house would be necessary, besides other essential facilities. It is said the plan would cost the government at least \$10,000,000, and the company reports say is not giving the enterprise any encouragement. As a result of a fire in the Public Service Railway's carhouse in Camden, March 3, reported in the ELECTRIC RAILWAY JOURNAL of March 9, seven cars were destroyed, five damaged badly and six partly burned. The latter are being repaired, five are rebuilding in the Newark shops and seven new cars are to be ordered, if not already in the hands of the Cincinnati company. In addition, if the increased fare for which the company is now presenting argument before the Board of Public Utility Commissioners is granted and of which it is reasonable to believe the application will be approved, twenty-five new cars will be ordered at once. Reports are also to the effect that if vari-

ous propositions now before the company go through at least 150 new cars is the total number contemplated.

### Trade Notes

N. M. Garland, New York, N. Y., district manager of the Ohio Brass Company, Mansfield, Ohio, has been elected a member of the board of directors.

Havana (Cuba) Electric Railway, Light & Power Company has purchased fifty two-motor equipments, GE-258 railway motors with K-9 controllers from Zaldo & Martinez, the General Electric Co.'s Cuban representatives.

Electrical Engineers' Equipment Company, Chicago, Ill., on April 4 gave a dinner to seventy-five of its employees and their wives, after which the entire party went in a body to hear "Billy" Sunday speak at his Lakeside Tabernacle.

Brooklyn (N. Y.) Rapid Transit Company's order for Gould slack adjusters, mentioned in the last issue of this paper, was placed directly with the Gould Coupler Co., and not through the Railway Utility Company as given in the note last week.

E. I. duPont de Nemours & Company, Wilmington, Del., have offered a series of prizes for the best photographs to illustrate the use of any of the duPont products. The offer is for photographs in each of the following six classes: Agricultural uses of explosives, fabrikoid, industrial uses of explosives, painting, trap shooting and hunting, miscellaneous.

### NEW YORK METAL MARKET PRICES

	April 10	April 17
Copper, ingots, cents per lb.....	23½	23½
Copper wire base, cents per lb.....	26½ to 26½	26½ to 26½
Lead, cents per lb.....	7	6.95
Nickel, cents per lb.....	50	50
Spelter, cents per lb.....	7	7
Tin, Straits, cents per lb.....	*85	90
Aluminum, 98 to 99 per cent., cents per lb.....	†32.10	†32.10

\* Nominal. † Government price in 50-ton lots, f.o.b. plant.

### OLD METAL PRICES—NEW YORK

	April 10	April 17
Heavy copper, cents per lb.....	22	22
Light copper, cents per lb.....	19½	19½
Red brass, cents per lb.....	18	18
Yellow brass, cents per lb.....	13	13
Lead, heavy, cents per lb.....	6½	6
Zinc, cents per lb.....	5½	5½
Steel car axles, Chicago, per net ton....	\$41.52	\$41.52
Old carwheels, Chicago, per gross ton....	\$29.00	\$29.00
Steel rails (serap), Chicago, gross ton....	\$34.00	\$34.00
Steel rails (relaying), Chicago, gross ton....	\$60.00	\$60.00
Machine shop turnings, Chicago, net ton.	\$16.50	\$16.25

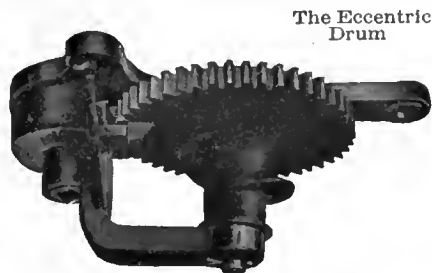
### ELECTRIC RAILWAY MATERIAL PRICES

	April 10	April 17
Rubber-covered wire base, New York, cents per lb.....	27 to 30	27 to 30
Weatherproof wire (100 lb. lots), cents per lb., New York.....	28½ to 34½	28½ to 34½
Weatherproof wire (100 lb. lots), cents per lb., Chicago.....	33.42 to 38.35	33.42 to 38.35
T rails (A. S. C. E. standard), per gross ton.....	\$70.00 to \$80.00	\$70.00 to \$80.00
T-rails, high (Shanghai), cents per lb.....	4½	4½
Rails, girder (grooved), cents per lb.....	4½	4½
Wire nails, Pittsburgh, cents per lb.....	3½	3½
Railroad spikes, drive, Pittsburgh base, cents per lb.....	4½	4½
Railroad spikes, screw, Pittsburgh base, cents per lb.....	8	8
Tie plates (flat type), cents per lb.....	*3½	*3½
Tie plates (brace type), cents per lb.....	*3½	*3½
Tie rods, Pittsburgh base, cents per lb.....	8	8
Fish plates, cents per lb.....	*3½	*3½
Angle plates, cents per lb.....	*3½	*3½
Angle bars, cents per lb.....	*3½	*3½
Rail bolts and nuts, Pittsburgh base, cents per lb.....	4.90	4.90
Steel bars, Pittsburgh, cents per lb.....	5	5
Sheet iron, black (24 gage), Pittsburgh, cents per lb.....	4.90	4.90
Sheet iron, galvanized (24 gage), Pittsburgh, cents per lb.....	5.80	5.80
Galvanized barbed wire, Pittsburgh, cents per lb.....	4.35	4.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.....	3.95	3.95

	April 10	April 17
Car window glass (single strength), first three brackets, A quality, New York, discount.....	80% to 82-3%	80% to 82-3%
Car window glass (single strength, first three brackets, B quality), New York, discount.....	79%	79%
Car window glass (double strength, all sizes AA-quality), New York discount.....	80%	80%
Waste, wool (according to grade), cents per lb.....	11½ to 22	11½ to 22
Waste, cotton (100 lb. bale), cents per lb.....	12½ to 13	12½ to 13
Asphalt, hot (150 tons minimum), per ton delivered.....	\$38.00	\$38.00
Asphalt, cold (150 tons minimum, pkgs. weighed in F. O. B. plant, Maurer, N. J.), per ton.....	\$42.00	\$42.00
Asphalt filler, per ton.....	\$45.00	\$45.00
Cement (carload lots), New York, per bbl.....	\$2.65	\$2.65
Cement (carload lots), Chicago, per bbl.....	\$2.71	\$2.71
Cement (carload lots), Seattle, per bbl.....	\$3.05	\$3.05
Linseed oil (raw, 5 bbl. lots), New York, per gal.....	\$1.59	\$1.59
Linseed oil (boiled, 5 bbl. lots), New York, per gal.....	\$1.60	\$1.60
White lead (100 lb. keg), New York, cents per lb.....	10	10
Turpentine (bbl. lots), New York, cents per gal.....	41	42

\* Government price.

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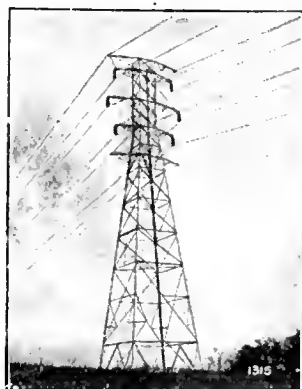
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Feeder Insulators

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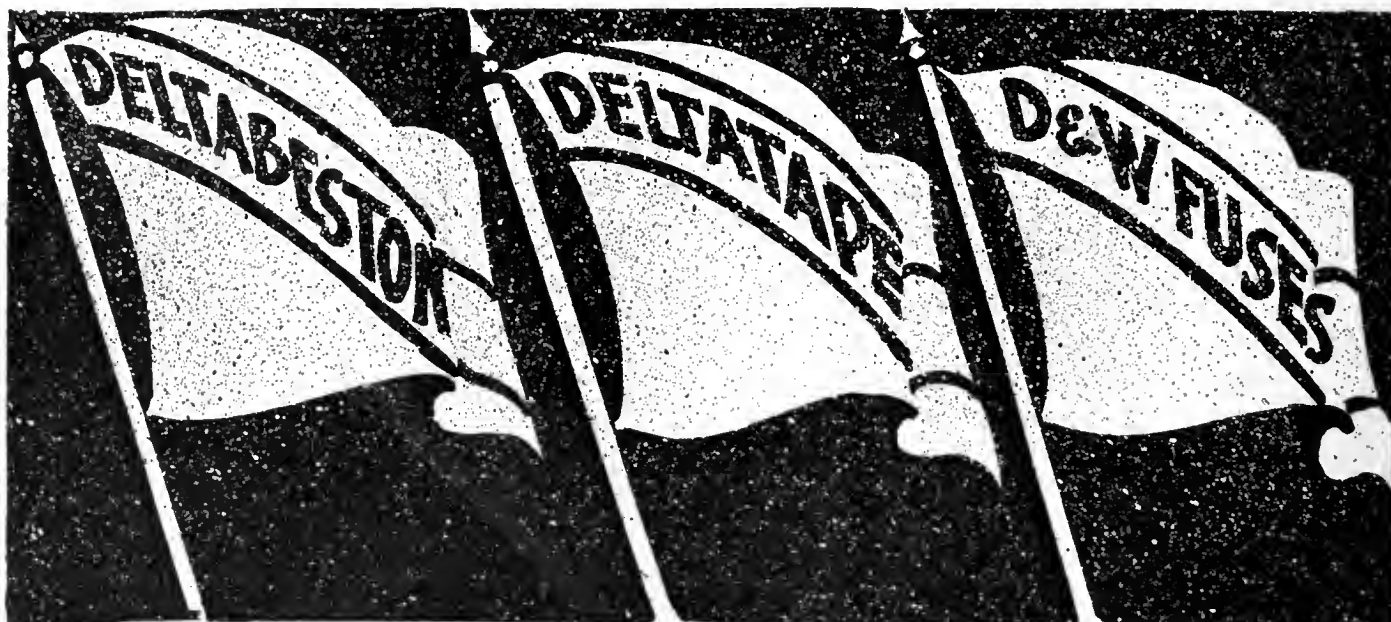
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"D & W" FUSES positively will blow without noise or flame. ALL cars of the Interborough Rapid Transit Co., New York, use them exclusively.

At any place "D & W" products will cut motor maintenance costs and reduce the greater though less tangible item of lost car-hours due to breakdowns in service.



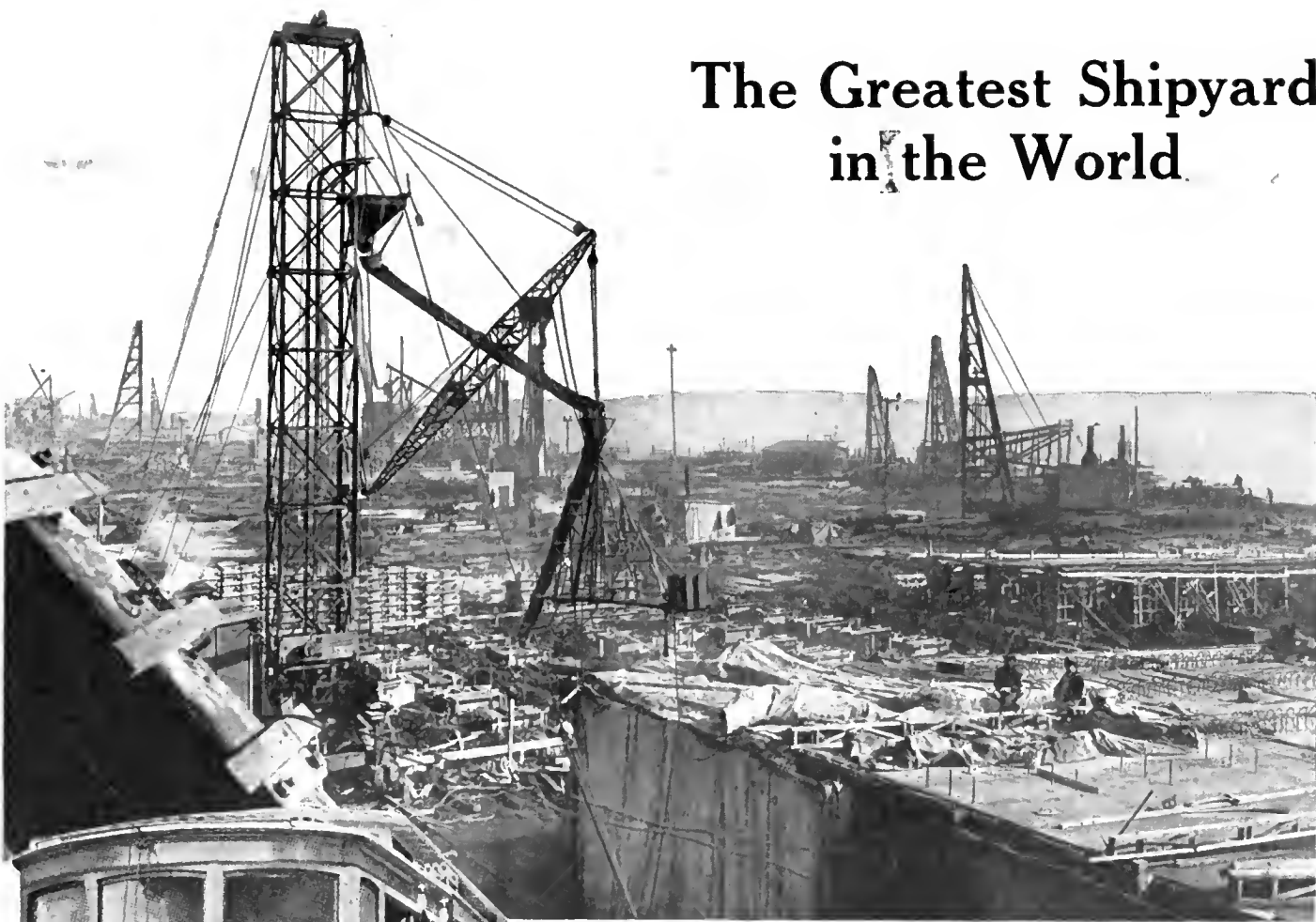
## D & W FUSE CO.

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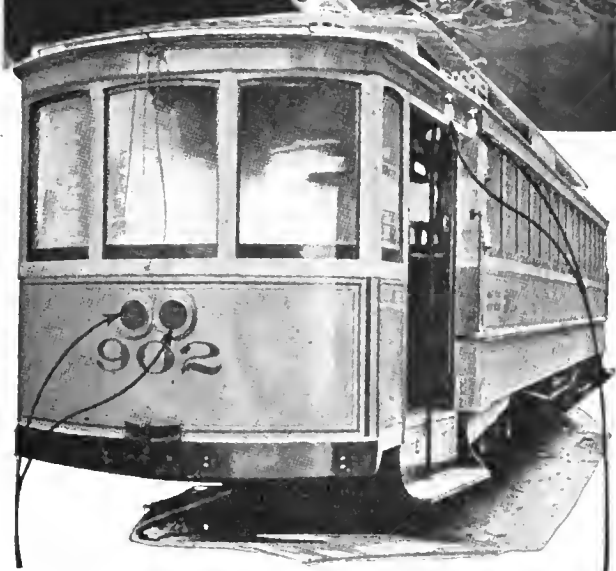




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# "N-L" INDICATING TAILLIGHTS

Nichols-Lintern Indicating Taillights are in use on many of the best equipped electric railway systems, among which might be mentioned Cleveland Railway Co., Toledo Railway & Light Co., The International Railway Co., Youngstown and Suburban Railway Co., and the St. Joseph system. Now comes the Philadelphia Rapid Transit Co. with an order for equipment of 100 cars on the line that runs to the stupendous Hog Island shipyards of the American International Corporation. The order comes from the Emergency Fleet Corporation and goes through on a priority certificate. For the great

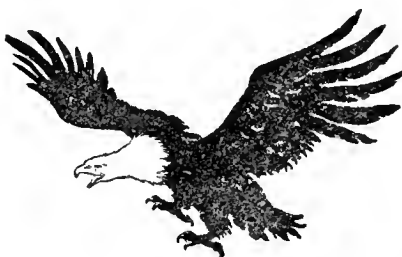
crowd of shipbuilders that will ride on these cars, provision must be made to save time by running the cars close together at rush hours. The "N-L" Indicating Taillights signal to the car following the operation of the controller. There are two colored lights, green and red. When power is off only the red light shows—at half speed, red and green lights—and when at full speed, only green shows. This is a wonderful help to motormen and auto drivers following to know how to regulate their speed. Prevents many accidents and allows motormen more coasting and less braking. The "N-L" Taillights are reliable.

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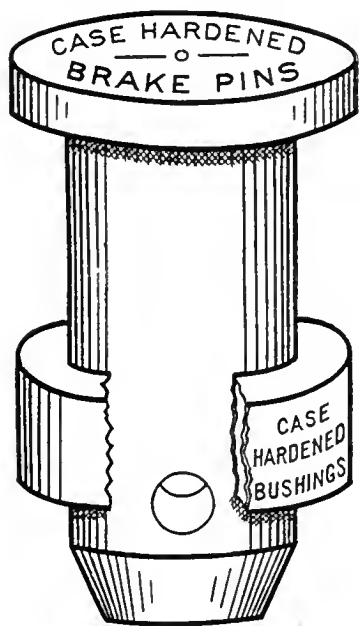
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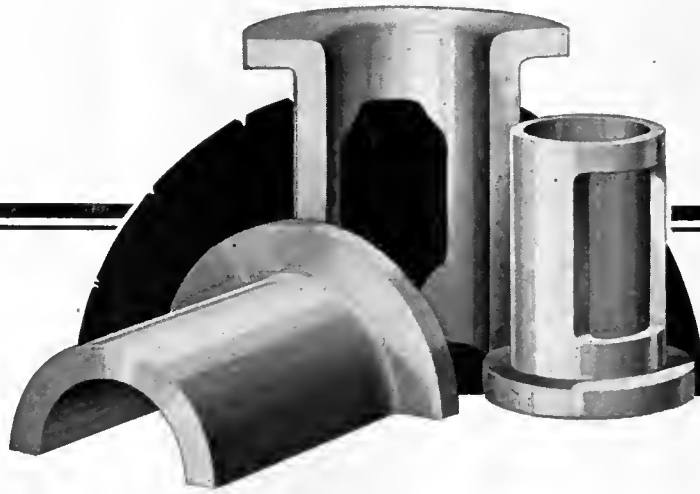
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The economy that stints in first cost, only to be undone in needless expenditures later, is an economy without basis in fact.

When you buy More-Jones “Tiger Bronze” you are sure of bearings that have been tried and proven under the most severe conditions of service. You get expert foundry practice, the benefit of over forty years’ experience, and our careful laboratory research.

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We’ll guarantee you the same experience.

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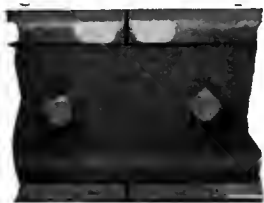
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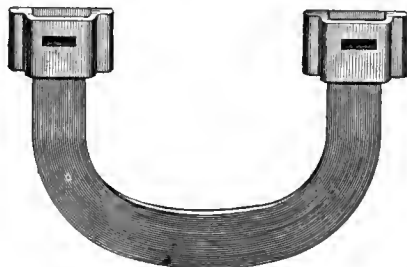
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Just to save a few dollars makeshifts are sometimes put in.

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*All Steel*

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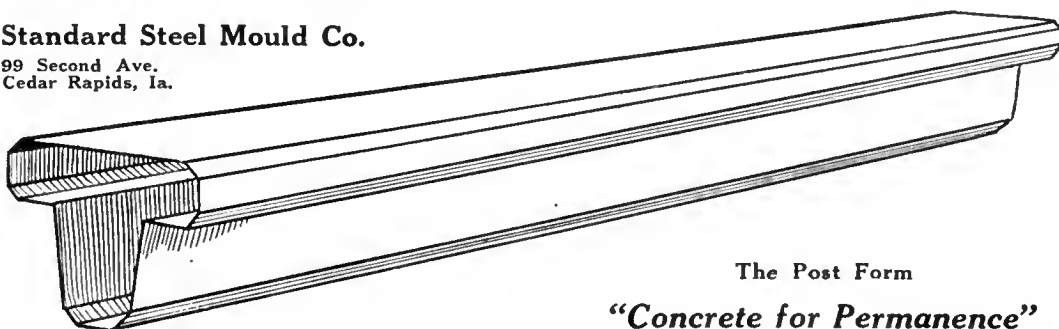
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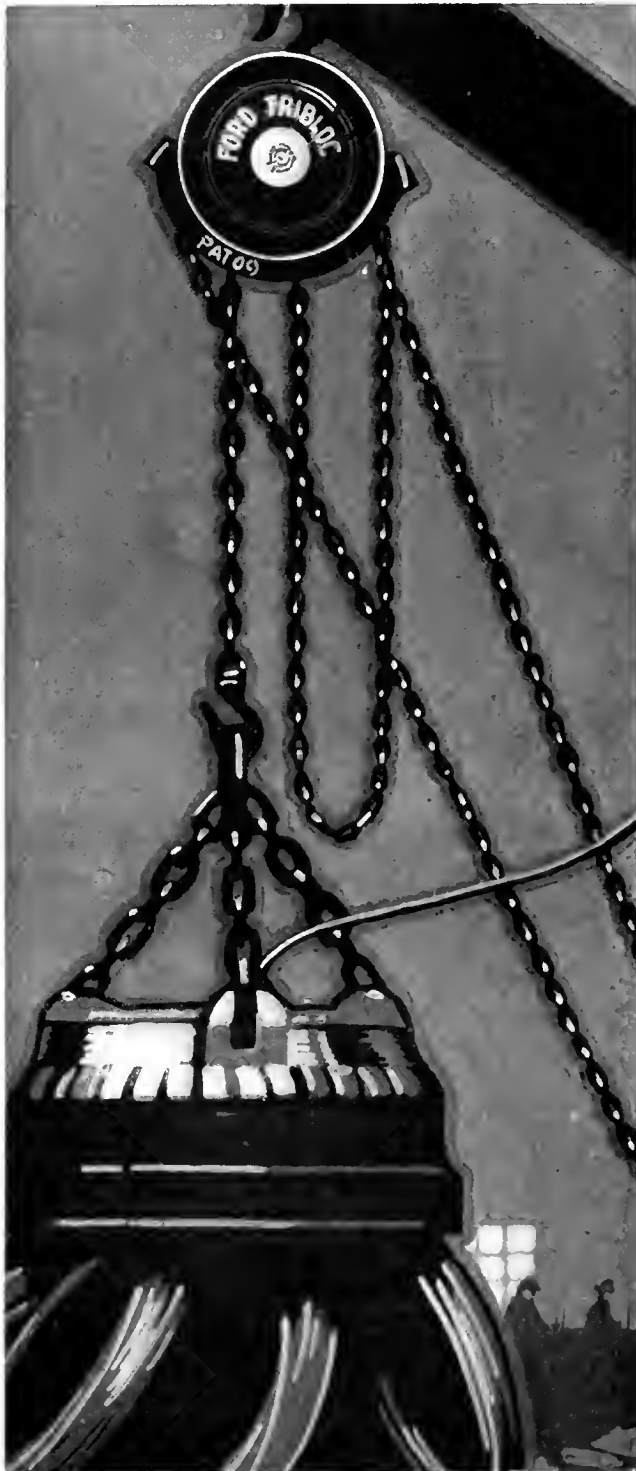
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Heavy work demands the last degree of substantiality and safety in a chain hoist.

Its demands are anticipated and met in the Ford Tribloc's construction. All working parts are of **steel**; the gears are of **steel**, covered by an independent dust-proof **steel** case; the hook swivels are made of forged **steel** and the chains and hooks are made of special **steel** stock of great ductility and high tensile strength.

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The tape which YOU use, must give quality service during every minute of its life.

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Their scientific construction gives them unrivaled strength and quality.

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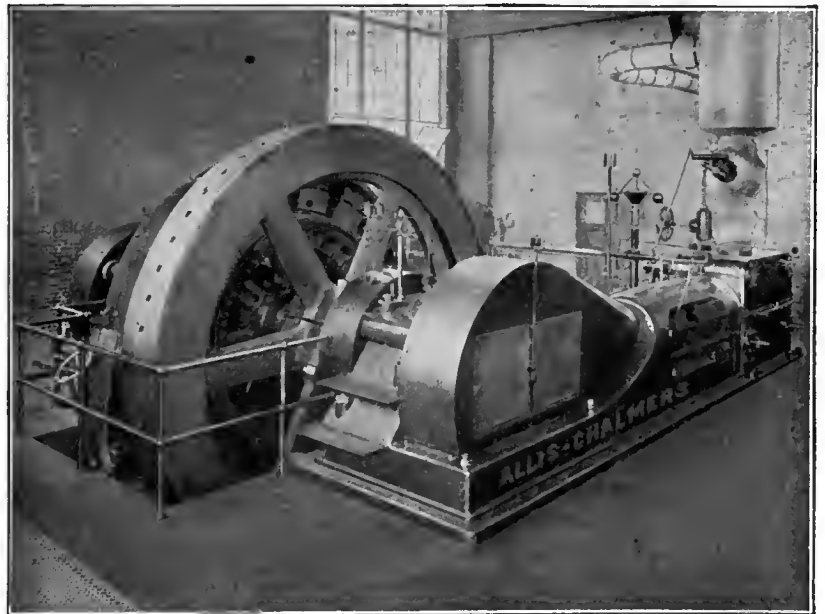
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“Noarks” meet all practical requirements; Send  
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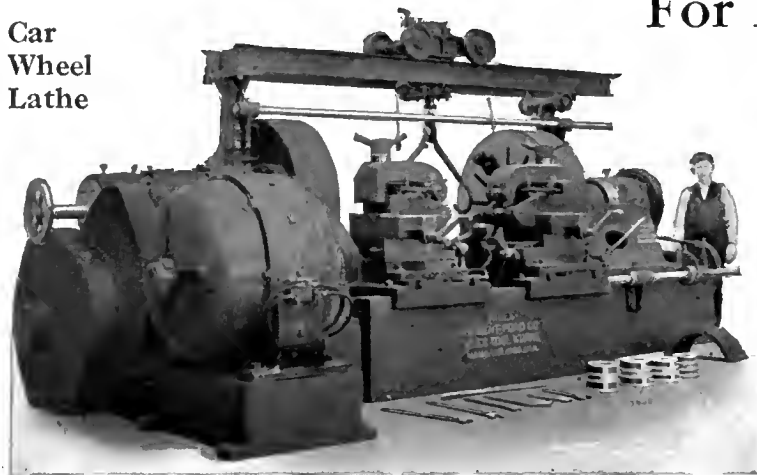
Cross-Compound Direct-Connected Corliss Engine Unit.

*Our 40 years' experience is at your service.*

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## **FMB** Grid Resistors

### ARE MADE RIGHT AND STAY RIGHT

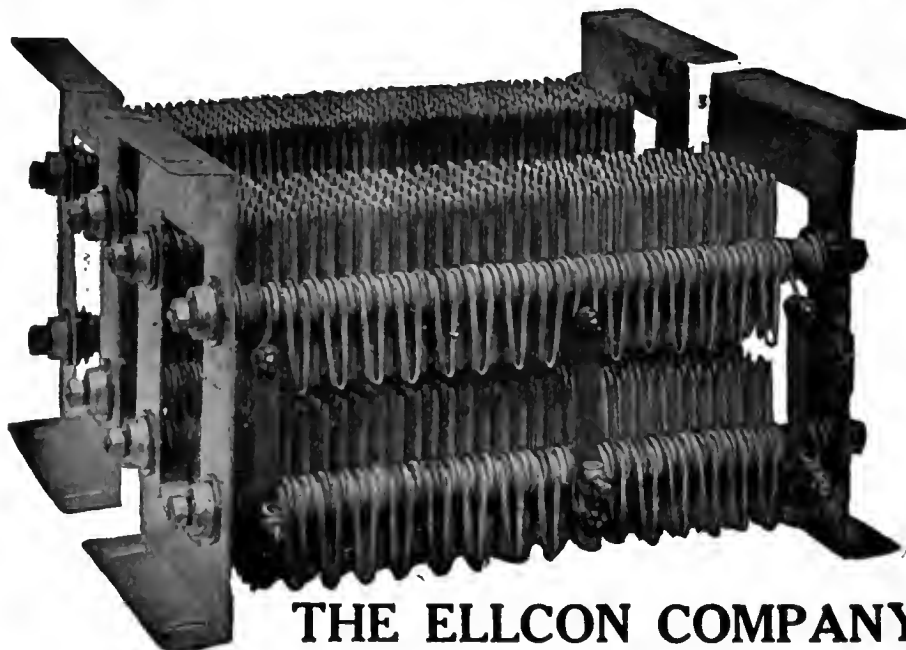
No resistors get more abuse than those under a car.

They are abused electrically by careless operation of the controller.

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E M B grid resistors actually have made this part of your equipment troubleproof.



**THE ELLCON COMPANY**  
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## Repair Bills Are Maintenance Expense

Your pole troubles are past reflections upon the adoption of ever-reliable BAYONET Harps and Bases.

Equip all your cars with BAYONET Harps and derive one-third longer service from the trolley wheels. BAYONET Wheels in BAYONET Harps double wheel mileage.

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Springfield, Ohio, U. S. A.



## Order Your Future Requirements Now to

## *Avoid Delay In Deliveries*

Under present day conditions the rolling mills are giving preference to Government requirements resulting in uncertain supply and deliveries on private contracts.

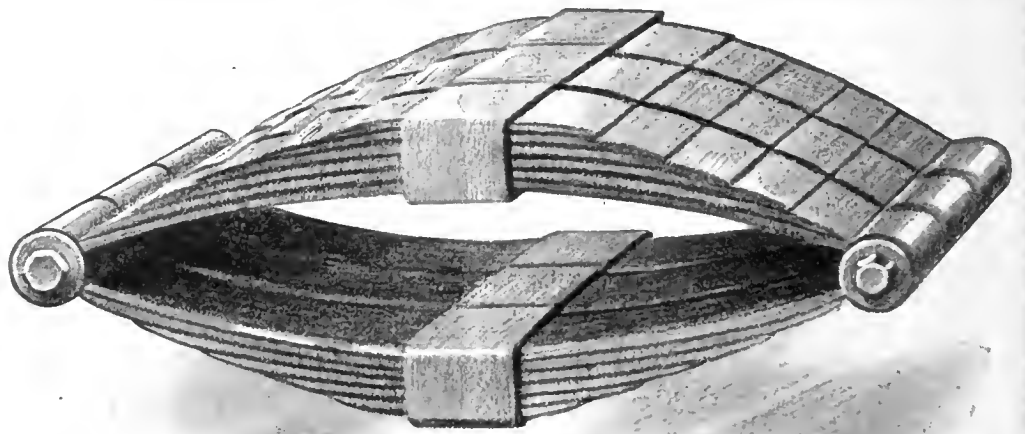
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with the sole idea of reducing, wherever possible, the liability to shocks, given by rail joints or other sudden changes in plans. Unnecessary weight is eliminated, saving wear and tear on track and rolling stock.

*Consult us before ordering new cars  
or rebuilding your old equipment*

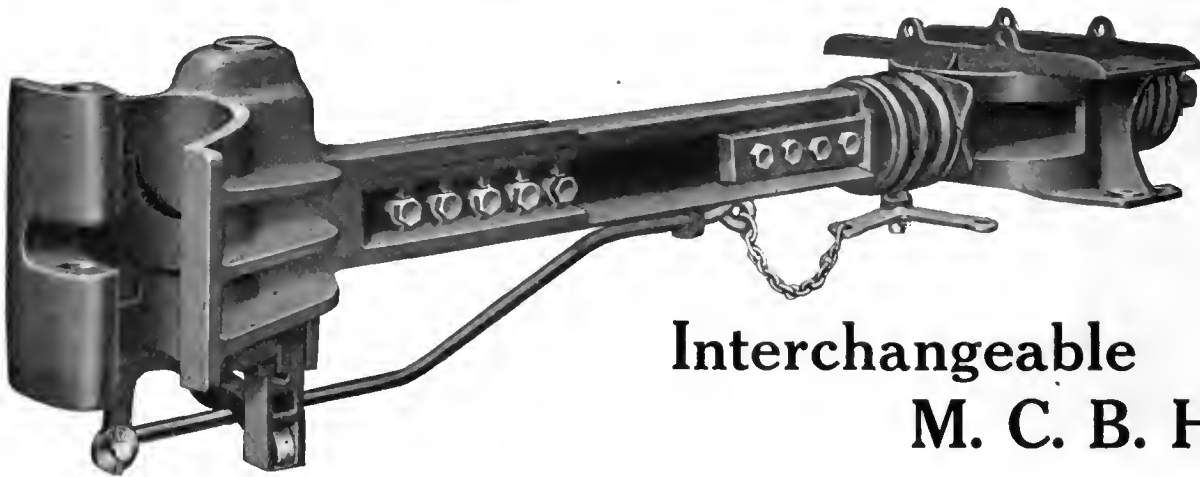
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The process is simple. Wherever the Van Dorn No. 15 or No. 18 coupler heads are in use you can replace them with the rugged, reliable Master Car Builders' standard head as illustrated on this page.

This M. C. B. head has the Van Dorn guarantee of workmanship behind it. It is superior to any other M. C. B. coupler on the market. The price is moderate.

*Deliveries can be made promptly.*

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The new high speed interurban cars recently placed in service by the Jamestown, Westfield & Northwestern Railroad are fitted with Standard No. 1062 rolled steel wheels mounted on Standard axles.

—Representative practice

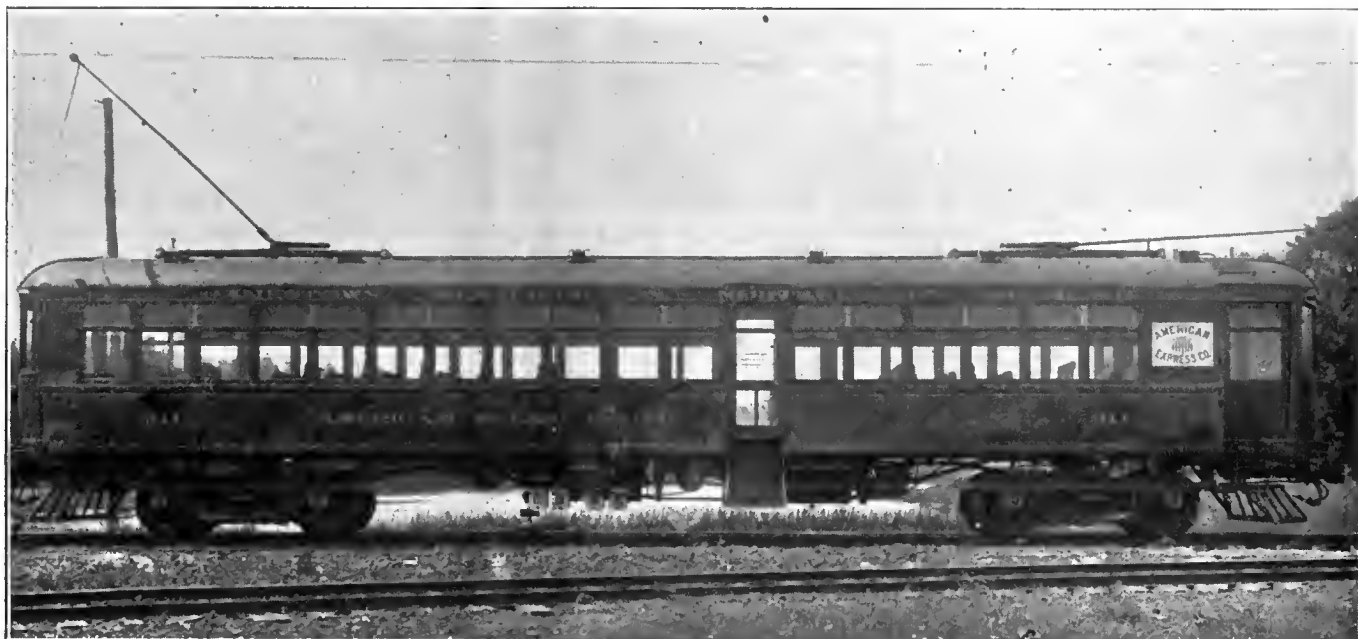


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No matter what your road conditions are, a Nachod will take care of them. There are 7 types of Nachods for all service, from high speed interurban to city travel.

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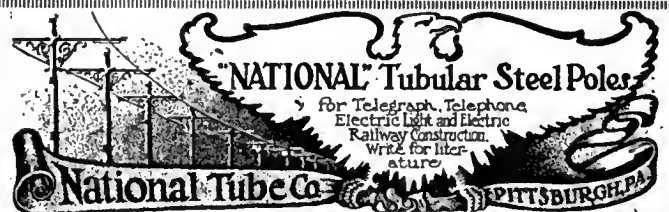
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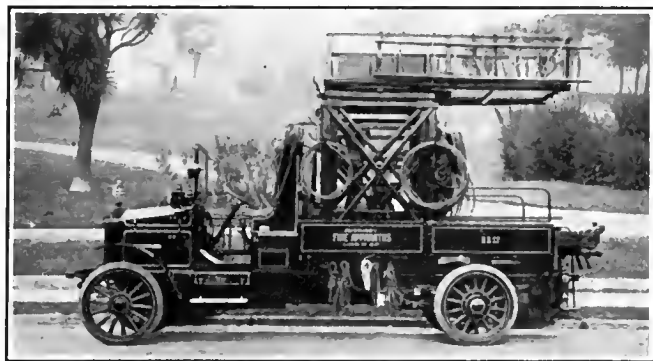
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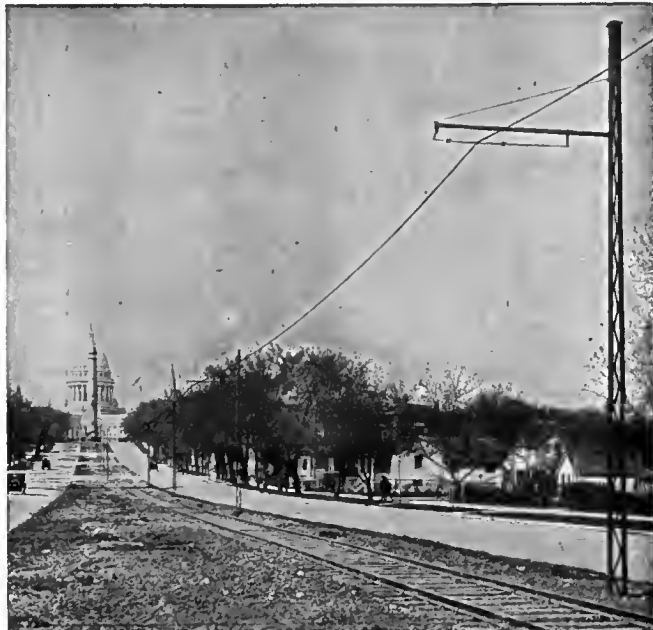
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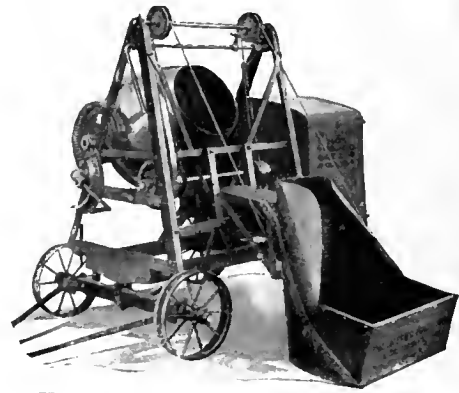


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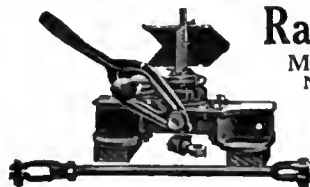
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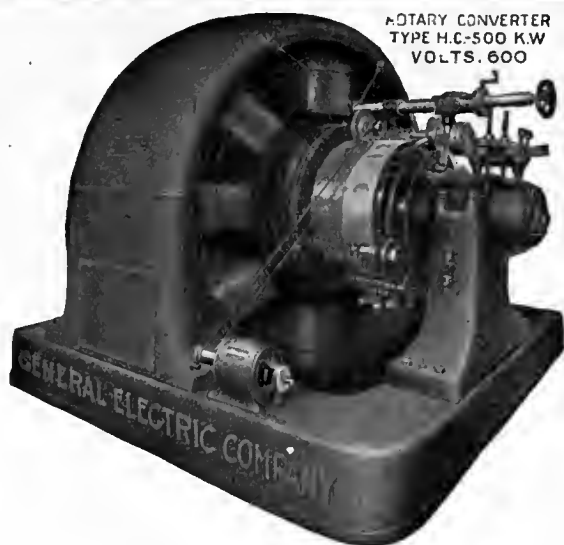
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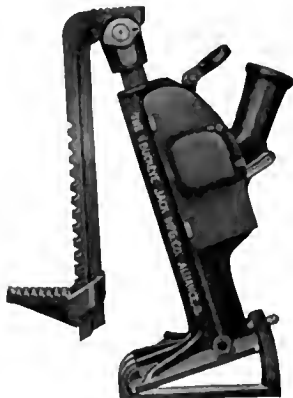
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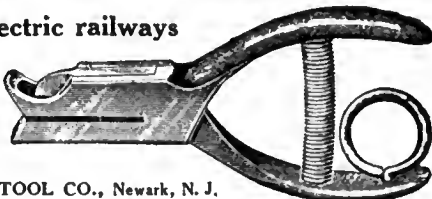
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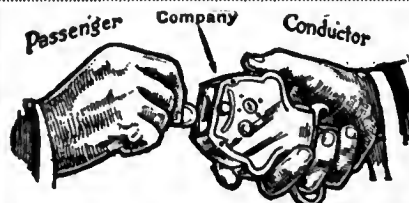
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AUDITOR; 16 years' experience with large interurban and city properties. Employed, solicits change. References from present and past employers. Age 37. Married. PW-108, Elec. Ry. Journal, Chicago.

AUDITOR Solicits change thirteen years' experience Street Railway Accounting. Age 35; married. References. PW-125, Elec. Ry. Journal.

ACCOUNTANT with ten years' experience public utilities, five of which I held position of secretary and treasurer in full charge of office. Now looking for position as office manager and will only consider those which promises to be permanent. Address, PW-133, Elec. Ry. Journal.

ENGINEER executive wants position as manager of public utility. Technical graduate, fifteen years engineering and executive work. Splendid record and references. PW-101, Elec. Ry. Journal, Chicago.

ELECTRICAL engineer, college graduate, 13 years' experience. Railway specialist with experience in construction, operation, valuation and handling of men. Reports and analysis made for engineering corporations, public authorities and operating systems. Examination made of properties and service rendered, traffic surveys, schedules and equipment, etc., with special attention to improvement to and economy of operation. PW-93, Elec. Ry. Journal Philadelphia.

### POSITIONS WANTED

CONTROLLER man or wireman wants position. 8 years' experience on all types controllers and car wiring. Best of references. PW-134, Elec. Ry. Journal.

EXECUTIVE of medium sized city and interurban property. Age 35, married, and now employed. Desires position as Manager or Ass't. Manager. Thoroughly familiar with operation and construction of both city and interurban lines. Especially good in handling Public relations and commission hearings. Correspondence confidential. PW-124, Elec. Ry. Journal, Philadelphia.

GENERAL manager, now employed, with 12 years' experience, capable of taking entire charge of road, will consider making change. Desirable man for those who control road but live at distant place. PW-131, Elec. Ry. Journal, Philadelphia.

GENERAL superintendent of property operating 80 city and interurban cars desires to change. Experience covers transportation, shop and track departments. References from present and past employers. PW-123, Elec. Ry. Journal, Philadelphia.

HIGH-GRADE operating man open for engagement as superintendent. Has high speed interurban, city and steam railroad experience of twenty years. First-class references; married; no preference as to locality. PW-99, Elec. Ry. Journal, Chicago.

MASTER mechanic:—by a practical high grade Electric Railway man. Technical education and a practical mechanic. Both city and high speed interurban experience. Married, good habits, best references. PW-129, Elec. Ry. Journal, Philadelphia.

MASTER mechanic or general foreman wants position; thoroughly experienced in most efficient and systematical methods of inspection and overhauling of

### POSITIONS WANTED

city and interurban cars, trucks, motors, controls, complete equipment, 12 years in charge of shops; age 35; married; now employed; references. PW-102, Elec. Ry. Journal, Chicago.

POSITION wanted. Manager, superintendent or auditor. Have 10 years' experience management railway and lighting property. For quick action address PW-107, Elec. Ry. Journal, Chicago.

SHOP foreman, experienced on city or interurban electric cars, wants position. 12 years' experience. PW-132, Elec. Ry. Journal, Chicago.

TRAFFIC man; eight years' experience with large electric railways. Familiar with both freight and passenger business. PW-109, Elec. Ry. Journal, Chicago.

TRAVELING auditor; experienced, best of references, employed. Exempt from military service. PW-110, Elec. Ry. Journal, Chicago.

WANTED, position as master mechanic or superintendent of equipment. Familiar with K-type M. and H. L. controls, city and high-speed interurbans, electric locomotive and MCB work. Have had twenty-five years' experience. Can leave at once. references. PW-114, Elec. Ry. Journal, Chicago.

APPRAISAL engineer, age 40, technical education and ten years' experience on interurban and street railway construction, power plants, transmission lines, elevated and subway lines. Five years' experience with State Utilities Commission on appraisal at electric railway and light, rate investigations, traffic surveys. Desires position with Public Service Corporation east of St. Louis. References. Maximum salary \$250 per month. Address PW-130, Elec. Ry. Journal, Cleveland.

## These Pages

receive the attention of electrical railway men everywhere. In every industry—in every form of electric service. Have you any proposition to put before these men? Anything to sell or buy that they may want or have? Whatever your message—

*Employment or Business Opportunities  
Offered or Wanted :: Plants, Properties,  
or Used Equipment For Sale or  
Wanted :: Bids Wanted for Furnishing  
Equipment or Supplies :: :: ::*

these pages—the “SEARCHLIGHT SECTION” of Electric Railway Journal will place your wants before over 8000 men.  
**TRY THEM!**



# SEARCHLIGHT SECTION

## Second Hand Equipment

### ROTARY CONVERTERS

FOR SALE—IMMEDIATE DELIVERY  
Two 200 Kw. 25 Cycle, 600 Volt, General Electric  
Rotary Converters. Each complete with Three  
General Electric 13,200 Volt, 75 Kw. Transformers.

Northwestern Pennsylvania Railway Co.  
Erie, Pa.

## RAILS

### RELAYERS—NEW

If you have any to  
sell, 12 lb. to 100 lb.,  
write, wire or phone us.

GENERAL EQUIPMENT CO  
30 Church Street, New York City

## Direct Current Belted Generator

1—500-kw., 550-V., 320 r.p.m.,  
Cp. Wd. Westinghouse 3 bearing  
direct current generator.

**DUQUESNE**  
Electric & Mfg. Co.

Bessemer Bldg., Pittsburgh

### 85 lb. A. S. C. E. Relays

16,000 tons—with Angle Bars to match.  
Available immediate shipment and centrally  
located.

We positively own these Rails and offer  
same in carload lots and over.

25,000 tons—Relays—sizes 25 lb. to 100  
lb., in stock our Pittsburgh yards and  
vicinity.

Immediate shipment guaranteed and prices  
very attractive.

Carload and less than carload inquiries and  
orders solicited.

Rails cut to length for structural purposes.  
Frogs, Switches, Bolts, Nuts, Spikes and all  
Accessories.

L. B. FOSTER COMPANY  
Park Building, Pittsburgh, Pa.

**CLEVELAND ARMATURE WORKS**  
Cleveland, Ohio

## Everything in the Line of Repairs to Electrical Machinery

Complete Armatures, New Armatures,  
Rewound Armature Cores, Armature  
Shafts, Armature Coils, Fields and  
Commutators.

Established 22 Years.

## Get your Wants into the Searchlight

### ADVERTISING RATES

#### Ads Set in Uniform Style

(Solid, in one paragraph, without display.)

THREE CENTS A WORD, minimum charge 50  
cents an insertion, payable in advance, less 10 per  
cent if one payment is made in advance for four  
continuous insertions—for advertisements under:

Positions Wanted	Vacation Work Wanted
Evening Work	Tutoring
Wanted	Salesman Wants Con-
	nections

FIVE CENTS A WORD, minimum charge \$1.50  
an insertion, for advertisement under:

Agencies Wanted	Positions Vacant
Agents Wanted	Partner Wanted
Business Opportunities	Representations Wanted
Desk Room for Rent	Salesmen Wanted
Educational	Patents for Sale
Employment Agencies	Plants for Sale
Desk Room Wanted	Sub-Contracts Wanted
Foreign Business	Work Wanted

Miscellaneous for Sale, for Rent or Want Ads.

THIRTY CENTS A LINE, minimum five lines,  
for all undisplayed advertisements set with a  
paragraph for each item or tabulated.

THREE DOLLARS AND SIXTY CENTS AN  
INCH for advertisements for bids (Official Propo-

sals).

#### Ads Set in Display Type

(Individual space, within border rules.)

Space for these advertisements is sold by the  
line. Each page contains 27 inches. The rate per  
line is based on the total number of inches to be  
used—that is, the number of inches the advertise-  
ment is to occupy multiplied by the number of  
insertions it is to receive. For instance, a 2-inch  
advertisement in 2 issues earns the 4-inch rate of  
\$3.90 an inch. A 1-inch space in 4 issues, or a 4-  
inch space in one issue, also earn the 4-inch rate.

#### SCHEDULE OF RATES

1 to 3 in., \$3.00 an in.	15 to 26 in., \$2.70 an in.
4 to 7 in., 2.90 an in.	27 to 49 in., 2.60 an in.
8 to 14 in., 2.80 an in.	50 to 99 in., 2.55 an in.

Rates for larger space furnished on request.

### INFORMATION

ALLOW FIVE WORDS for the address, if replies  
are to a box number in care of any of our offices.  
There is no extra charge for forwarding replies.

IN REPLYING TO ADS, do not enclose original  
testimonials or anything that you may want re-  
turned. State your experience and qualifica-  
tions in as concise and neat a manner as possible  
and enclose copies of your testimonials.

BE CAREFUL TO PUT ON ENVELOPE, when  
answering any "blind," ad, the box number in the  
ad, the name of the paper, and also the local  
address of office to which reply is sent:

36th St., at 10th Ave.,	New York
1570 Old Colony Bldg.,	Chicago
657 Leader-News Bldg.,	Cleveland
935 Real Estate Trust Bldg.,	Philadelphia
501 Rtn to Bldg.,	San Francisco

WHEN ADVERTISING MACHINERY, use  
your own name and address—or a local address of  
some kind—so that the readers can wire direct and  
get quick replies. We advise also that you state  
in your advertisement the present location of plant  
that is offered for sale, or point of delivery provided  
you are in the market for equipment.

TO SIGN YOUR NAME and address to your  
advertisement begets the confidence of the reader  
and facilitates receiving replies. You can, however,  
obviate delay in receiving answers by signing your  
ad. only with initials (your own or others), care  
of your home, your office or a post-office box  
number in your city.

For quick and satisfactory results  
tell the reader everything that  
he will want to know

### POSITIONS VACANT

CAR house foremen wanted, night, two.  
Good pay to start and excellent oppor-  
tunity for advancement. Maryland loca-  
tion—Locations vacant operate about 50  
cars with G. E. and West. equipment.  
P-117, Elec. Ry. Journal, Philadelphia.

ELECTRICAL engineers with some rail-  
way experience wanted for valuation  
work. Salary \$1500. Give outline of  
experience first letter. Address M. V. A.  
Room 502, 721—13th St., Washington,  
D. C.

EXPERIENCED shop and car house elec-  
tric railway repairman wanted. Good  
wages of start with excellent chance for  
advancement. Large Railway Company  
located Middle East. P-118, Elec. Ry.  
Journal, Philadelphia.

OFFICE man wanted, experienced and re-  
liable, to handle general office work for a  
commercial company located in New York  
City which deals exclusively with Street  
Railways. Prefer man 30 to 35 who is  
familiar with the best methods of bank-  
ing, bookkeeping and the handling of ma-  
terials and supplies. Right party will be  
given plenty of chance for advancement  
and an interest in the company if agree-  
able. References required. P-119, Elec.  
Ry. Journal.

### INSPECTORS WANTED

for operation of city cars on a North-  
ern property. Salary to start \$110.00  
per month. Give experience, age, etc.

P97—Elec. Ry. Journal,  
Leader-News Bldg., Cleveland, Ohio.

### POSITIONS WANTED

APPRAISAL engineer, age 40, technical  
education and ten years' experience on  
interurban and street railway construc-  
tion, power plants, transmission lines,  
elevated and subway lines. Five years'  
experience with State Utilities Commis-  
sion on appraisal of electric railway and  
light, rate investigations, traffic surveys.  
Desires position with Public Service Cor-  
poration east of St. Louis. References.  
Minimum salary \$250 per month. Ad-  
dress PW-130, Elec. Ry. Journal, Cleve-  
land.

## The Searchlight Advertising in This Paper

is read by men whose success depends upon  
thorough knowledge of means to an end—  
whether it be the securing of a good second-  
hand piece of apparatus at a moderate  
price, or an expert employee.

## The Best Proof

of this is the variety of this journal's  
Searchlight ads. Without a constant and  
appreciable demand for such machinery or  
services, by its readers, the market-place  
which these advertisements represent  
could not exist for any length of time.

Are you using the Searchlight Section?



# WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry  
with Names of Manufacturers and Distributors

**Advertising, Street Car.**  
Collier, Inc., Barron G.

**Air Cleaners.**  
Horne Mfg. Co.

**Air Rectifiers.**  
Holden & White, Inc.

**Alloys, Steel and Iron.**  
(See also Bearings and Bearing Metals.)  
Titanium Alloy Mfg. Co.

**Anchors, Guy.**  
Electric Service Supplies Co.  
Holden & White, Inc.  
Johns-Manville Co., H. W.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

**Anti-Climbers.**  
Railway Improvement Co.

**Automobiles and Buses.**  
Brill Co., The J. G.

**Axle Straighteners.**  
Columbia M. W. & M. I. Co.

**Axles, Car Wheel.**  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Carnegie Steel Co.  
National Railway Appliance Co.  
St. Louis Car Co.  
Standard Steel Works Co.  
Westinghouse Elec. & M. Co.

**Babbittling Devices.**  
Columbia M. W. & M. I. Co.

**Badges and Buttons.**  
Electric Service Supplies Co.  
International Register Co., The

**Batteries, Dry.**  
Johns-Manville Co., H. W.  
Nichols-Lintern Co.

**Batteries, Storage.**  
Electric Storage Battery Co.

**Bearings and Bearing Metals.**  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
General Electric Co.  
More-Jones Brass & Metal Co.  
St. Louis Car Co.  
Westinghouse Elec. & M. Co.

**Bearings, Center and Roller Slide.**  
Holden & White, Inc.  
Stucki Co., A.

**Bearings, Oilless, Graphite, Bronze and Wood**  
Bound Brook Oil-less Bearing Co.

**Bearings, Roller and Ball.**  
Gurney Ball-Bearing Co.  
S. K. F. Ball Bearing Co.

**Bells and Gongs.**  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
St. Louis Car Co.

**Benders, Rail.**  
Niles-Bement-Pond Co.  
Zelnicker Sup. Co., W. A.

**Boilers.**  
Babcock & Wilcox Co.

**Boiler Cleaning Compounds.**  
Dearborn Chemical Co.  
Johns-Manville Co., H. W.

**Boiler Coverings.**  
Johns-Manville Co., H. W.

**Boiler Tubes.**  
National Tube Co.

**Bond Testers.**  
American Steel & Wire Co.

**Bonding Apparatus.**  
American Steel & Wire Co.  
Electric Railway Improvement Co.  
Electric Service Supplies Co.  
Imperial Brass Mfg. Co.  
Ohio Brass Co.

**Bonds, Rail.**  
American Steel & Wire Co.  
Electric Railway Improvement Co.  
Electric Service Supplies Co.  
General Electric Co.  
Johns-Manville Co., H. W.  
Lincoln Bonding Co.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

**Book Publishers.**  
McGraw-Hill Book Co., Inc.

**Boring Tools, Car Wheel.**  
Niles-Bement-Pond Co.

**Braces, Rail.**  
Kilby Frog & Switch Co.

**Brackets and Cross Arms. (See also Poles, Ties, Posts, Etc.)**  
Bates Expanded Steel Truss Co.  
Electric Service Supplies Co.  
Hubbard & Co.  
Lindsay Bros. Co.  
Ohio Brass Co.

**Brake Adjusters.**  
Holden & White, Inc.  
Westinghouse Traction Brake Co.

**Brake Shoes.**  
Amer. Brake Shoe & Fdry. Co.  
Barbour-Stockwell Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
St. Louis Car Co.

**Brackets and Cross Arms**  
Electric Railway Equipment Co.

**Brakes, Brake Systems and Brake Parts.**  
Allis-Chalmers Mfg. Co.  
American Bridge Co.  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Holden & White, Inc.  
Horne Mfg. Co.  
National Brake Co.  
St. Louis Car Co.  
Westinghouse Trac. B. Co.

**Bridges and Buildings**  
American Bridge Co.

**Brooms, Track, Steel or Rattan.**  
Zelnicker Supply Co., W. A.

**Brush Holders.**  
Anderson Mfg. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Eureka Co.

**Brushes, Carbon.**  
General Electric Co.  
Jeandron, W. J.  
Morgan Crucible Co.  
United States Graphite Co.  
Westinghouse Elec. & M. Co.

**Brushes, Graphite.**  
Dixon Crucible Co., Jos.  
United States Graphite Co.

**Buckets, Grab**  
Beaumont Co., R. H.

**Bunkers, Coal**  
American Bridge Co.  
Beaumont Co., R. H.

**Bushings, Case Hardened and Mangnese.**  
Bemis Car Truck Co.

**Bushings, Graphite and Wooden**  
Bound Brook Oil-less Bearing Co.

**Cables. (See Wires and Cables.)**

**Carbon Brushes. (See Brushes, Carbon.)**

**Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—See those headings.)**

**Car Trimmings. (For Curtains, Registers, Doors, Seats, etc.—See those headings.)**

**Cars, Passenger, Freight, Express, etc.**

American Car Co.  
Brill Co., The J. G.  
Kuhlman Car Co., G. C.  
McGuire-Cummings Mfg. Co.  
St. Louis Car Co.  
Wason Mfg. Co.

**Cars, Second Hand.**  
Carr Co., C. E. A.  
Electric Equipment Co.

**Cars, Section**  
Mudge & Co.

**Cars, Self-Propelled.**  
Electric Storage Battery Co.  
General Electric Co.

**Castings, Brass, Composition or Copper.**

Anderson Mfg. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
Horne Mfg. Co.  
More-Jones Brass & Metal Co.

**Castings, Gray Iron and Steel.**

American Bridge Co.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Horne Mfg. Co.  
St. Louis Car Co.  
Standard Steel Works Co.  
Union Spring & Mfg. Co.

**Castings, Malleable and Brass.**  
Amer. Brake Shoe & Fdry. Co.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Horne Mfg. Co.  
St. Louis Car Co.

**Catchers and Retrievers, Trolley.**  
Electric Service Supplies Co.  
Holden & White, Inc.  
Horne Mfg. Co.  
Ohio Brass Co.  
Wood Co., Chas. N.

**Ceiling, Car.—(See Head Lining.)**

**Chain and Belt Machinery**  
Beaumont Co., R. H.

**Circuit Breakers.**  
General Electric Co.  
Westinghouse Elec. & Mfg. Co.

**Clamps and Connectors for Wires and Cables.**

Anderson Mfg. Co., A. & J. M.  
Electric Service Supplies Co.  
General Electric Co.  
Hubbard & Co.  
Klein & Sons, Mathias  
Ohio Brass Co.  
Westinghouse Elec. & Mfg. Co.

**Cleaners and Scrapers Track.—(See also Snow-Flows, Sweepers and Brooms.)**

Brill Co., The J. G.  
Ohio Brass Co.

**Clusters and Sockets.**  
General Electric Co.

**Coal and Ash Handling.—(See Conveying and Hoisting Machinery.)**

**Counting Recorders.**  
Railway Improvement Co.

**Coil Banding and Winding Machines.**

Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
D. & W. Fuse Co.

**Colls, Armature and Field.**  
Cleveland Armature Works.  
Columbia M. W. & M. I. Co.  
D. & W. Fuse Co.  
General Electric Co.  
Independent Lamp & Wire Co.  
Westinghouse Elec. & M. Co.

**Colls, Choke and Kieklng.**  
Electric Service Supplies Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.

**Coln-Counting Machines.**  
International Register Co., The  
Commutator Slotters.

Electric Service Supplies Co.  
General Electric Co.  
Westinghouse Elec. & Mfg. Co.  
Wood Co., Chas. N.

**Commutator Truing Devices.**  
General Electric Co.  
Jordan Bros., Inc.

**Commutators or Parts.**  
Cameron Elec'l Mfg. Co.  
Cleveland Armature Works.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
General Electric Co.  
Westinghouse Elec. & Mfg. Co.

**Compressors, Air.**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Westinghouse Trac. B. Co.

**Concrete Mixers**  
Jaeger Machine Co.

**Condensers**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.

**Conduits, Flexible**  
Tubular Woven Fabric Co.

**Conduits, Underground.**  
Johns-Manville Co., H. W.

**Controller Regulators.**  
Electric Service Supplies Co.

**Controllers or Parts.**  
Allis-Chalmers Mfg. Co.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Horne Mfg. Co.  
Johns-Manville Co., H. W.  
Westinghouse Elec. & Mfg. Co.

**Controlling Systems.**  
General Electric Co.  
Westinghouse Elec. & Mfg. Co.

**Converters, Rotary.**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Westinghouse Elec. & Mfg. Co.

**Conveying and Hoisting Machinery.**  
American Bridge Co.  
Beaumont Co., R. H.  
Columbia M. W. & M. I. Co.  
Green Engrg. Co.

**Cord, Bell, Trolley, Register, etc.**  
Brill Co., The J. G.  
Electric Service Supplies Co.  
International Register Co., The  
Roebbling's Sons Co., John A.  
Samson Cordage Works

**Cord Connectors and Couplers.**  
Electric Service Supplies Co.  
Samson Cordage Works  
Wood Co., Chas. N.

**Couplers, Car.**  
Brill Co., The J. G.  
Ohio Brass Co.  
Van Dorn Coupler Co.  
Westinghouse Trac. B. Co.

**Couplings, Conduit.**  
Horne Mfg. Co.

**Cranes. (See also Hoists.)**  
Allis-Chalmers Mfg. Co.  
Beaumont Co., R. H.  
Niles-Bement-Pond Co.

**Cresosoting. (See Wood Preservatives.)**

**Cross Arms. (See Brackets.)**

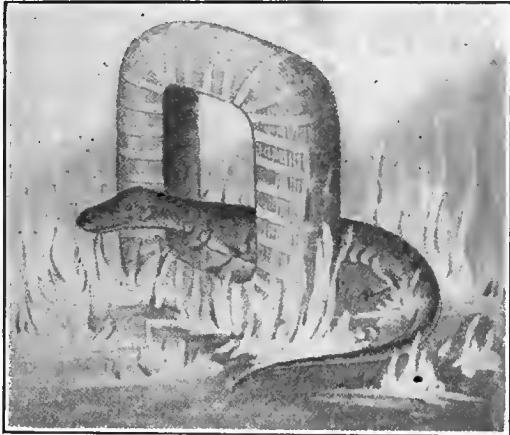
**Crossing Foundations.**  
Balkwill Manganese Crossing Co.  
International Steel Tie Co.

**Crossing Signals. (See Signals, Crossing.)**

**Crossings, Track. (See Track, Special Work.)**

**Crushers, Rock**  
Allis-Chalmers Mfg. Co.

**Culverts.**  
Canton Culvert & Silo Co.



## Get those coils back into service—quick!

Don't let LABOR SHORTAGE hold them up in your coil department. You can't get more men—but you can save time and money by sending the coils to us for re-insulation with

### SALAMANDER Pure Asbestos

We will return them promptly—better insulated and more durable than when new.  
"Salamander" asbestos wire excels in insulating value and cannot burn out under the severest overload. Leading electric railways are our best customers. Write us for details now.

**Independent Lamp & Wire Co., Inc.**

OFFICES:

FACTORIES:

1737 Broadway, New York    York, Pa., and Weehawken, N. J.

# BRAKE SHOE STANDARDS

**BRAKE HEADS**—to take  
Standard Pattern Shoe  
One standard driver shoe  
One standard car shoe  
And there you are—

ASK US

**American Brake Shoe & Foundry Co.**

30 Church St., New York

McCormick Bldg., Chicago

Chattanooga, Tenn.



## Weston

### Electrical Indicating Instruments

are unqualifiedly superior to any other instruments designed for the same service.

A. C. or D. C. Switchboard or Portable Instruments for every field of Indicating Electrical Measurement. In writing for catalogs and bulletins, please specify the field that interests you.

**WESTON ELECTRICAL INSTRUMENT CO.**

21 Weston Avenue, Newark, N. J.

23 Branch Offices in the Larger Cities

**B. A. HEGEMAN, JR., President**  
**CHARLES O. CASTLE,**  
*First Vice President*  
**E. D. HILLMAN,**  
*Secretary and Engineer*

**HAROLD A. HEGEMAN,**  
*Vice Pres. and Treasurer*  
**FRED C. DUNHAM,**  
*Assistant to President*

# NATIONAL RAILWAY APPLIANCE COMPANY

50 East 42d St., NEW YORK CITY

Hegeman-Castle Corporation    National Railway Appliance Co.  
Chicago    Washington, D. C.

# RAILWAY SUPPLIES

### Selling Agents for

Tool Steel Gears and Pinions

Johnson Fare Box

Perry Side Bearings

Hartman Centering Center Plates

Wasson Trolley Bases

Rimco Rubber Insulated Pliers

Garland Ventilator

Electric Arc Welders

High Class Railway Varnishes and Enamels

Axles and Forgings

Elastic Car Waste

Special Agents for {  
TOOL STEEL GEAR & PINION CO.  
RUBBER INSULATED METALS CORP.  
JOHNSON FARE BOX CO.  
C. & C. ELECTRIC & MFG. CO.  
HOLDEN & WHITE, INC.

General Agents for ANGLO-AMERICAN VARNISH CO.

Eastern Agents for UNION FIBRE CO.

Eastern & Southern Agents for LACLEDE STEEL CO.

## WHAT AND WHERE TO BUY

**Curtains and Curtain Fixtures.**  
Brill Co., The J. G.  
Electric Service Supplies Co.  
Hartshorn Company, Stewart  
St. Louis Car Co.

**Cutting Apparatus, Oxy-Acetylene.**  
Imperial Brass Mfg. Co.

**Derailing Devices. (See also Track Work.)**  
Cleveland Frog & Crossing Co.

**Destination Signs.**  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.

**Detective Service.**  
Wisch Service, P. Edward

**Door Operating Devices.**  
Consolidated Car Heating Co.  
National Pneumatic Co.

**Doors, Asbestos.**  
Johns-Manville Co., H. W.

**Doors and Door Fixtures.**  
Brill Co., The J. G.  
General Electric Co.  
Hale & Kilburn Co.

**Doors, Folding Vestibule.**  
National Pneumatic Co.

**Draft Rigging. (See Couplers.)**

**Drills, Track.**  
American Steel & Wire Co.  
Electric Service Supplies Co.  
Niles-Bement-Pond Co.  
Ohio Brass Co.

**Dryers, Sand.**  
Electric Service Supplies Co.  
Zelnicker Sup. Co., W. A.

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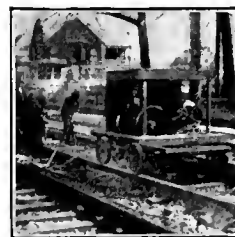
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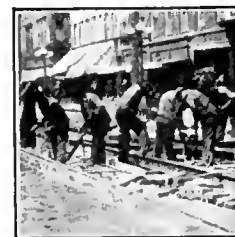
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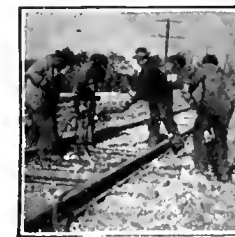
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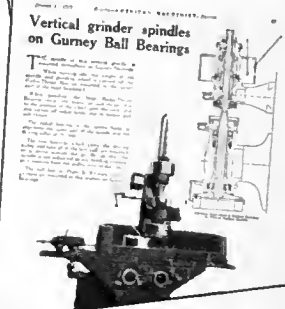
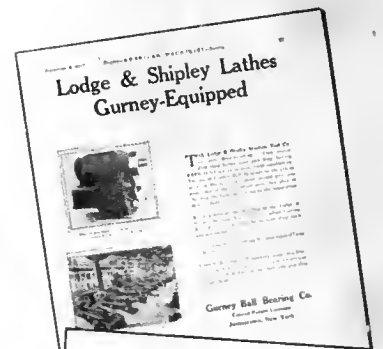
The rapidly increasing use of ball bearings in high-grade machinery is indicated in the group of Gurney Advertisements shown at the right of this page.

These advertisements show Lodge & Shipley selective head lathes, Pratt & Whitney vertical surface grinder, Baker Brothers heavy duty drills, Heald Machine Company rotary surface grinder, and Morris Machine Tool Company radial drill. These are only a few of the many satisfied users of Gurney Ball Bearings, but they give some idea of the standing of the Gurney Bearing in the machine tool trade.

In machine tools, motors and car journals, Gurney Ball Bearings save power and reduce maintenance costs.

## Gurney Ball Bearing Co.

Conrad Patent Licensee  
Jamestown, N. Y.



# GURNEY

# The Peter Witt Car for Busy Lines

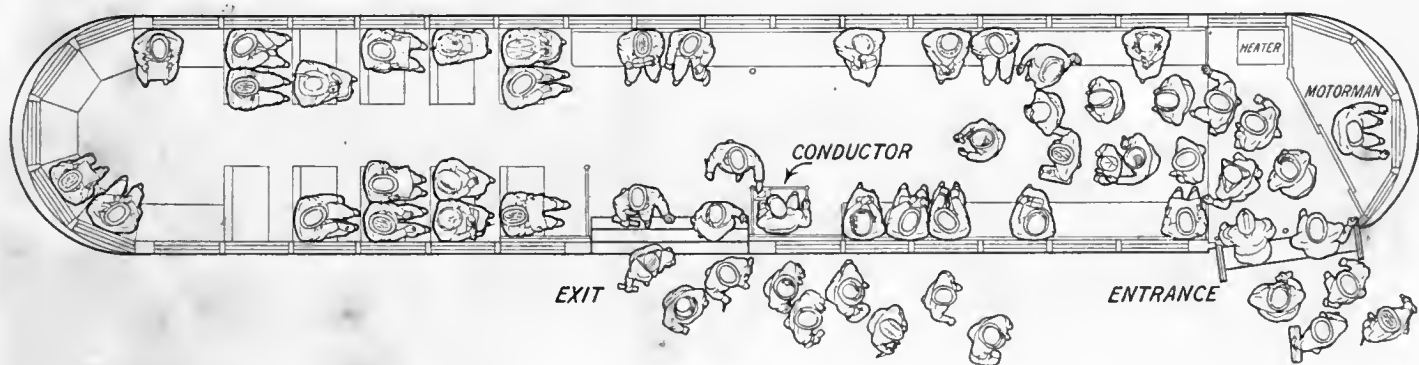
THE "bird's-eye view" of the Peter Witt Car at the bottom of this page shows how uninterruptedly passengers get in and out. No delays at stops by conflicting movement of passengers. No conductor at or near the platform to hold up the car while he feverishly collects fares, makes change, answers questions, begs passengers to move further along. The stop is just long enough for a double line of people to swarm aboard at the front or off the centre. Plenty of time for fare collection. Result, half the time saved at terminals and principal street stops, faster schedules, more cars on the lines, more passengers carried and carried more comfortably, no missed fares. The Peter Witt Car is not only the most efficient car for rush-hour service but is admirably adapted to one-man operation during slack hours by moving the fare box to the front. Every phase of the subject is covered by information ready to be sent you.

THE J. G. BRILL COMPANY  
PHILADELPHIA, PA.

G. C. KUHLMAN CAR COMPANY  
CLEVELAND, OHIO

AMERICAN CAR COMPANY  
ST. LOUIS, MO.

WASON MANUFACTURING CO.  
SPRINGFIELD, MASS.





# One More G-E Achievement in Electric Railroading

The three most important problems in electric railroad operation in the last quarter century have been solved by the General Electric Company in connection with the Chicago, Milwaukee & St. Paul Electrifications. These achievements are:

**First**—The development of the 3000 v. direct current system.

**Second**—Direct current regeneration with standard railway motors making possible safe and reliable braking on down grades, at the same time returning power to the line.

**Third**—The develop-

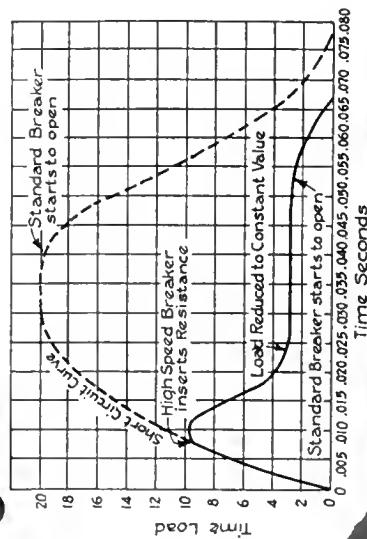
ment of the high-speed air circuit breaker for the short circuit protection of substation apparatus.

Oscillograph records taken under actual short circuit conditions show that this protective device practically anticipates a short circuit by operating within eight one-thousandths of a second. Furthermore, its use makes it possible to tap the feed wires into the trolley directly at the substation. A type "MW" 3000-volt circuit breaker fully protects from short circuit each of the fourteen 4000-K.W. Chicago, Milwaukee & St. Paul Railway substations.

This protective device can be furnished for generators and synchronous converters and is recommended in all cases where short circuits or unusual load conditions may occur.

Write to the General Electric Company for assistance in solving your protection problems.

25-1



## General Electric Company

General Office:

Sales Office:

# ELECTRIC RAILWAY JOURNAL

McGraw-Hill Company, Inc. April 27, 1918

ONLY TRULY CONTINUOUS EFFORT CAN WELD  
THE NATION'S MANIFOLD RESOURCES INTO AN  
IRRESISTIBLE FORCE FOR VICTORY. PUT  
THAT EFFORT BACK OF THE  
THIRD LIBERTY LOAN



METAL & THERMIT CORPORATION. 120 BROADWAY NEW YORK



## Confidence

Confident that in the end the public will be fair and grant the increased revenue necessary to provide adequate service, the Boston Elevated Railway Company are adding 35 cars on the Cambridge Subway line.

Successful operation is assured. The control equipments are duplicates of the Westinghouse Unit-Switch Control with which all Cambridge Subway cars are equipped.

The motors are the most modern Westinghouse No. 577, rating 200 horsepower.

Westinghouse Electric & Manufacturing Company  
East Pittsburgh, Pa.



# Westinghouse



# Electric Railway Journal

H. W. BLAKE, *Editor*

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### P. R. R. Extends Philadelphia Electrification

Newly electrified branch taps one of best suburban sections of the Quaker City. Construction shows that overhead for single-phase railway lines is approaching standardization. Outdoor transformer stations a feature of this branch of the Pennsylvania system.....Page 798

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Memphis Street Railway keeps elaborate records of the performance of its equipment based on systematic inspection. Efficiencies checked up every three months. Tables and graphs show comparative results by years.....Page 806

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SAN FRANCISCO, Rialto Building  
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American Machinist  
Power  
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Coal Age  
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# *It's Easy-*

## *-To Order Westinghouse Renewal Parts-*

It is not necessary to leaf through a multitude of forms, or voluminous tabulated lists, to find the particular part you want.

The Westinghouse Renewal Parts Catalogue is made up for your equipment specifically.

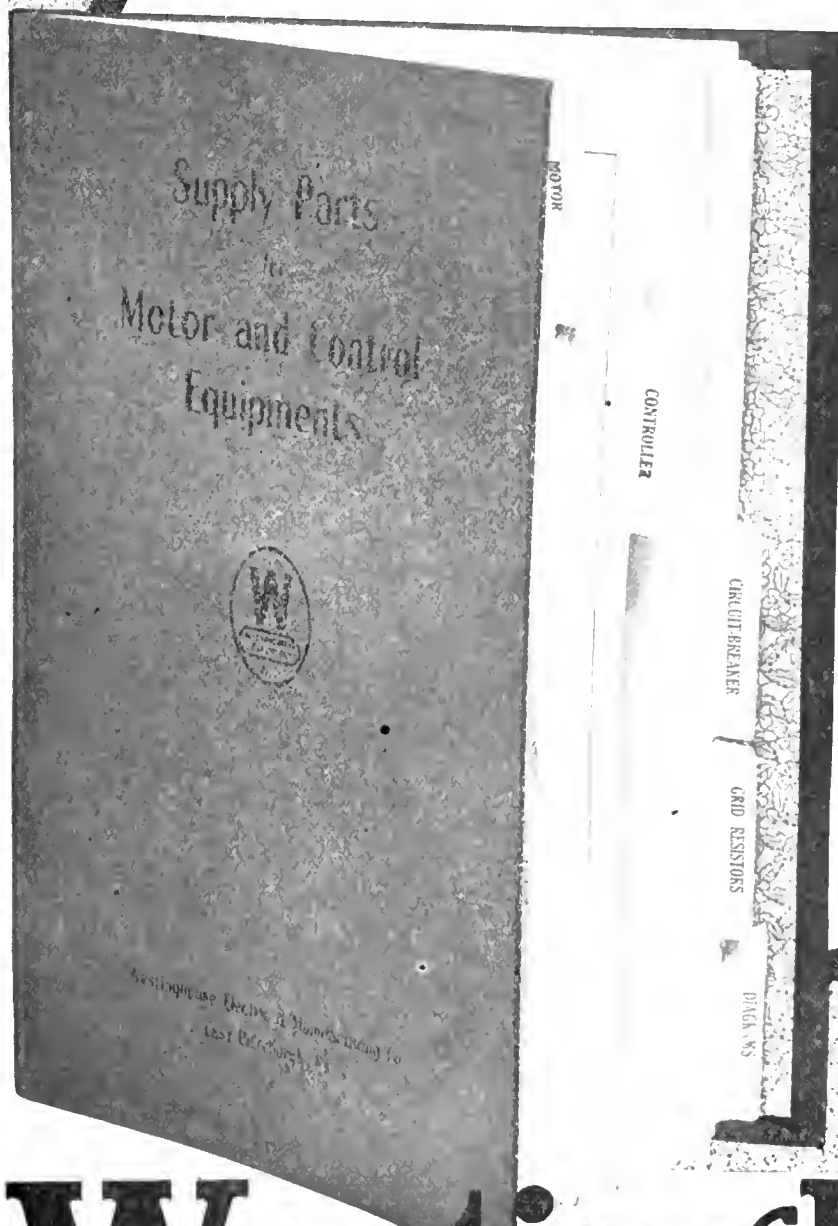
It contains nothing to interfere with convenient reference.

Photographic illustrations are used where possible to facilitate identification of parts.

The Book is conveniently indexed.

This is a service rendered to all our customers, and if you do not receive your Catalogue with reasonable promptness, kindly advise us.

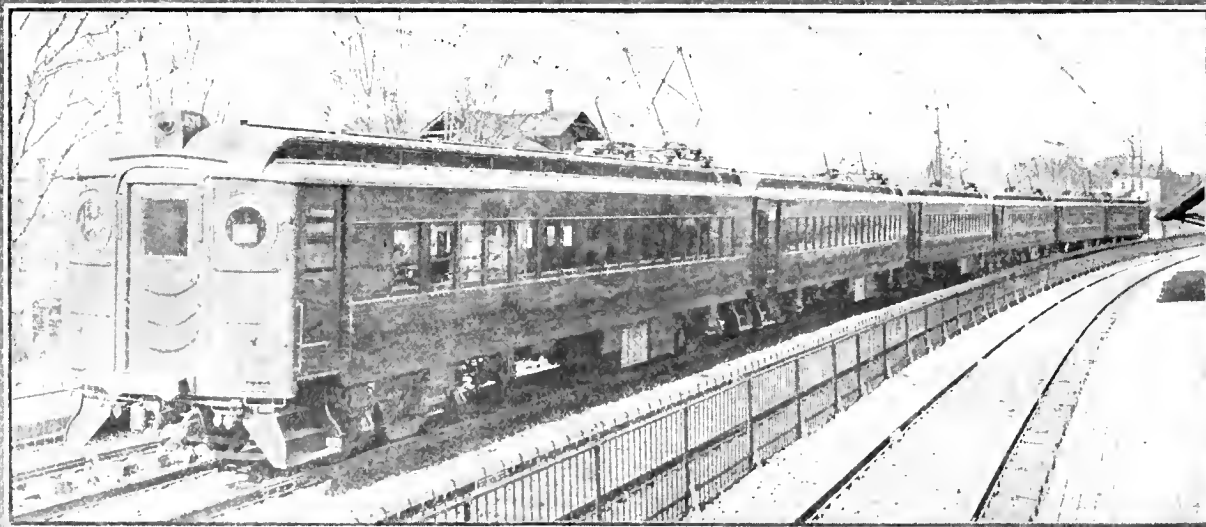
Westinghouse Electric  
& Manufacturing Co.  
East Pittsburgh, Pa.



# Westinghouse



# Power and Flexibility



Electrically operated train on the Pullman division, P. R. R., equipped with Electro-Pneumatic Brake

The Electro-Pneumatic brake possesses the power and flexibility which insures safety of High-Speed train movement and short, smooth station stops.

*Brake Building our Business for a Lifetime*

## Westinghouse Traction Brake Company

General Offices and Works, Wilmerding, Pa.

Atlanta, Ga.  
Boston, Mass.  
Chicago, Ill.  
Columbus, O.

Denver, Col.  
Houston, Tex.  
Los Angeles, Cal.



Mexico City  
New York, N. Y.  
Pittsburgh, Pa.

San Francisco  
Seattle, Wash.  
St. Louis, Mo.  
St. Paul, Minn.

# Phono-Electric

## The Ideal Wire for Live Suburban Lines



A live suburban line is the ideal place for Phono-Electric trolley wire.

As traffic on such a line is constantly increasing, it is highly desirable that the original current-carrying capacity of the trolley wire be sufficient for years to come.

If a copper wire is installed, the loss, because of wear, will be very rapid, and breaks of the weakened wire will be frequent, too.

Not so with Phono-Electric—it is so tough that ordinary suburban service will cause hardly any wear or loss of conductivity.

And, of course, there'll be no breaks!

**Bridgeport Brass Company**  
Bridgeport Connecticut



# PRODUCTS



O-B Type D Splicer—Patented



O-B Type D Splicing Ear—Patented

## A “Heavy Duty” Splicer

From every angle, the O-B Type D Splicer is especially fitted for severe service.

It has a generous cross-section of tough bronze. It will stand a great deal of wear.

It is strong. Even after it has been in service for a time it will break any trolley wire—copper, Phono-electric or steel.

It has the tried and proved O-B “Lily” approach, which means snug fit on the wire, smooth underrun for trolley wheel.

The trolley wire enters with enough bend to increase holding power. Still it has no kinks to weaken it.

The O-B Type D Splicer belongs at points of hard service, where reliability is essential.

*Ask us more about the Type D and what it will do for you.*

**THE OHIO BRASS COMPANY, Mansfield, Ohio**

New York   Philadelphia   Pittsburgh   Chicago   Los Angeles   San Francisco

# Reclamation of Old Rails

## A True War Time Economy



Even if you could afford to pay the enormous prices for rail steel, you could not get deliveries in time to keep your track equipment in good condition.

Safeguard yourself against dangerous deterioration of your track at a big saving in repair cost by using the

### Indianapolis Portable Electric Welder

It will build up the weak spots in your old rails in a short time, making cupped rails, broken frogs, switches, cross-overs, joint plates, etc., as good as when new.

No special skill is required. Your own men quickly become experts.

The machine has actually paid for itself within 60 days, by the decreased track maintenance charge.

Used by hundreds of prominent railway companies with complete success.

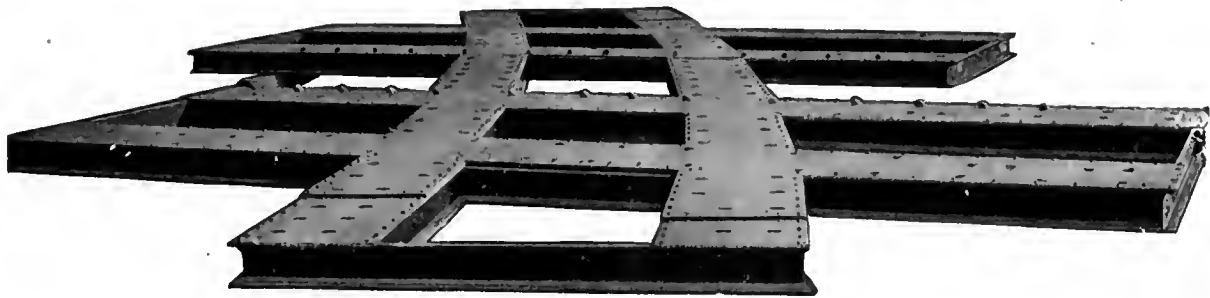
Ask us for full details on "Simplex" and "Apex" Welded Rail Joints.



*Users of Indianapolis Patented Welders and Joints Fully Protected*

**Indianapolis Switch & Frog Company, Springfield, Ohio**





# The Solution for One of the Most Difficult Track Problems

## INTERNATIONAL STEEL CROSSING FOUNDATIONS

Crossing frog maintenance and renewals are the bane of the railway maintenance department. Racking on the unstable foundations furnished by any arrangement of wooden ties is the principal cause of this condition. Crossing frogs are continually out of line and surface. Bolt and filler block breakages soon wreck perfectly good crossing frogs.

A unit bearing on a ruggedly built steel foundation obviates these difficulties.

The steel foundation furnishes a large spread bearing that bridges the soft spots in the ballast and supports the joints. The steel bearing absolutely prevents movement between the members forming the frog.

Isn't this the answer to your particular difficulties? Why put off the day of determining for yourself what many others know from experience? Let us prove our claims to your satisfaction.

Prompt deliveries made from stock

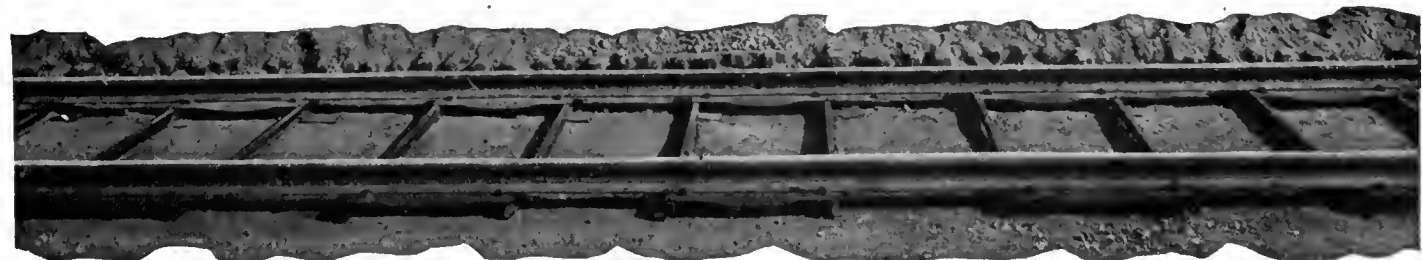
## The International Steel Tie Company

Manufacturer of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES:

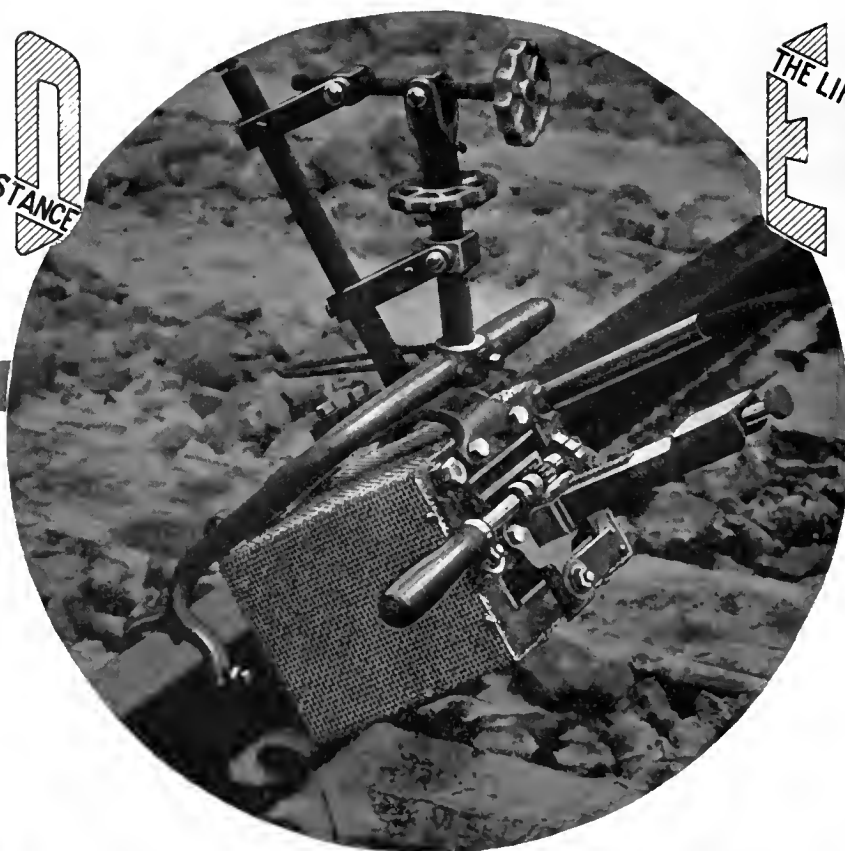
Western Eng'g Sales Co., Los Angeles, Cal.	San Francisco, Cal. Seattle, Wash.	R. J. Cooper Co., Salt Lake City, Utah	J. E. Lewis & Co., Dallas, Texas	Maurice Joy, Philadelphia	William R. Ziegler, Minneapolis, Minn.
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ERICO  
THE LINE OF LEAST RESISTANCE

ERICO  
THE LINE OF LEAST RESISTANCE



# ERICO

## Portable Welders

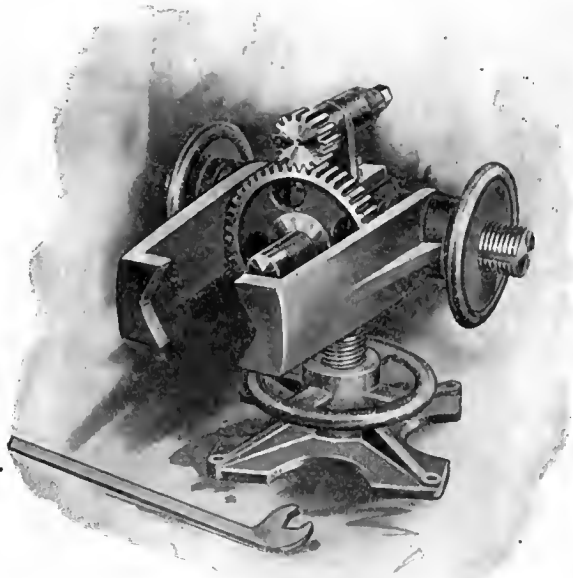
Because of its easy removal and transport, the Erico Portable Welder is shown to be an efficient working unit and permits applications where larger equipment would be impracticable or impossible.

have now *made good*.  
Tested and tried in two  
years of actual service  
they have met all ex-  
pectations.

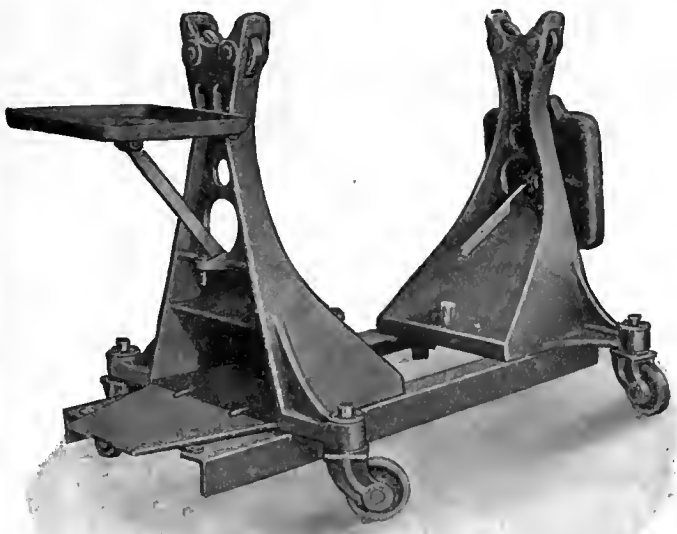
The Welder Portion  
shown in the photograph  
weighs but 65 pounds  
complete with mountings.  
It is easily handled by *one*  
man. No flame or arc  
strikes either the rail or  
the *bond*.



The Electric Railway Improvement Co.  
Cleveland, Ohio

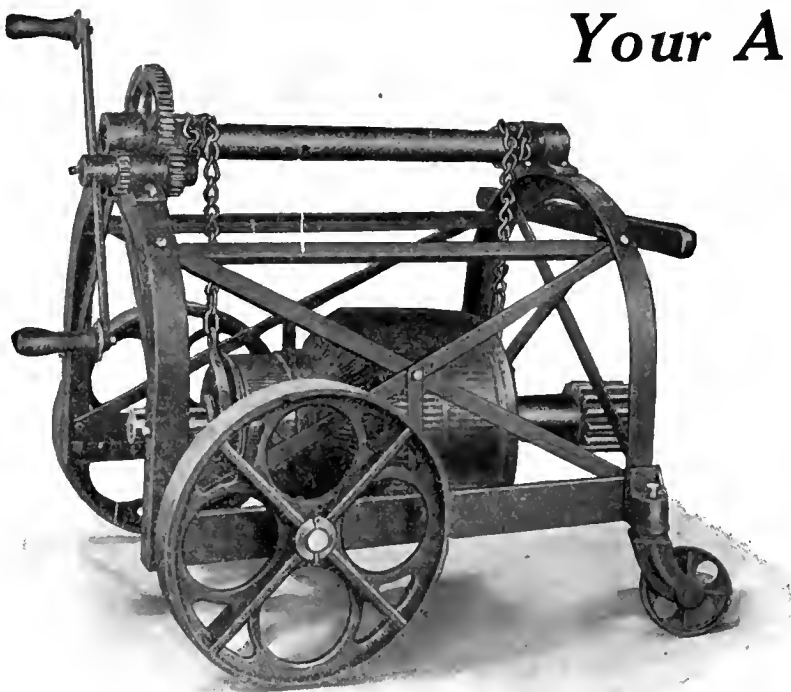


PINION PULLING MACHINE  
Type M



ARMATURE WINDING STAND  
Type G

# Use These to Speed-Up Your Armature Repairs



ARMATURE TRUCK  
Type F

Peerless Car Barn Appliances and Tool offer the very best means of speeding up your Armature and various other repairs. Each tool or appliance is designed for its special work, and from our catalog you can select from various types of each just the ones to meet your requirements.

Illustrations show typical Peerless shop equipment and demonstrate how strongly and accurately they are made, each tool or appliance having many features embodied only in the Peerless line.

*Write for Special Catalog*

**ELECTRIC SERVICE SUPPLIES Co.**  
*Manufacturer of Railway Material and Electrical Supplies*

PHILADELPHIA  
17th and Cambria Sts.

NEW YORK  
50 Church St.

CHICAGO  
Monadnock Bldg.

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg

# The 1st of May Thrift Stamp Day In The U. S. A.

The Active Cooperation of Every Reader of  
**ELECTRIC RAILWAY JOURNAL**  
Is Urgently Requested to Make It A Success

May 1, 1918, will be observed throughout the United States as Thrift Stamp Day! On that day retail stores everywhere in every line of business will ask customers to take part of their change in Thrift Stamps! It will be patriotic for every man, woman and child to accept at least one Thrift Stamp as change on every purchase made that day—and to make as many purchases as possible on May 1.

Here is a big, practical way of getting millions of Thrift Stamps into the hands of the people of the United States, and of insuring the success of the Government's War Savings Stamps campaign. Thrift Stamp Day will help everyone. It will prove a tremendous boost to business. On May 1, 1918, the nation should do the biggest total retail business of any single day in our history! The beneficial habit of Thrift will be sown broadcast among the citizens of the U. S. A.! Most important

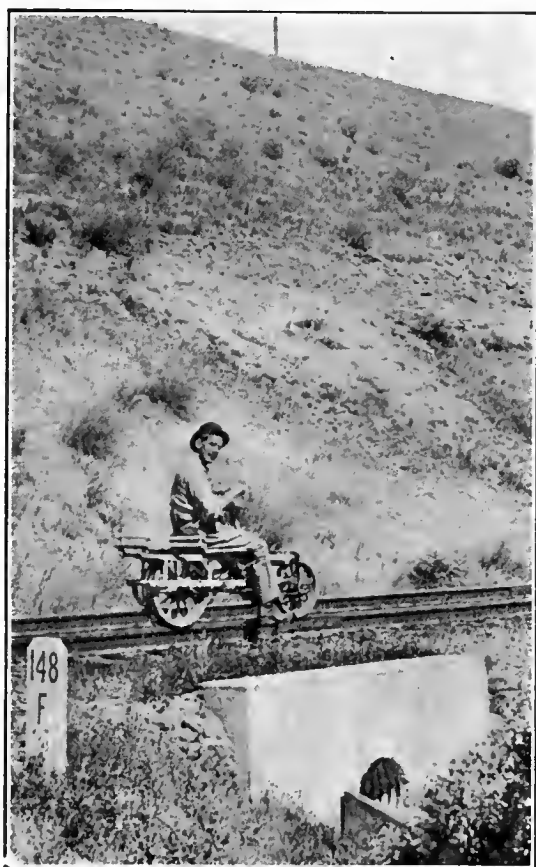
of all, Uncle Sam will be furnished with the sinews of War and Victory!

American business must go "over the top" at once in a quick drive to make Thrift Stamp Day an overwhelming success. You electric railway men and manufacturers must talk Thrift Stamp Day among your trade, arouse the enthusiasm of the retailers, the storekeepers, the clerks behind the counters. Uncle Sam needs your help. A practical plan has been prepared showing how each one of you can "do your bit" to make Thrift Stamp Day a red letter day in American business annals. Write for this plan today without fail. Remember, in helping Uncle Sam you are helping business and helping yourselves. Address Mr. W. Ward Smith, National War Savings Committee, 51 Chambers St., New York City.



**NATIONAL WAR SAVINGS COMMITTEE**  
51 Chambers Street, New York City





## “ARMCO” IRON CULVERTS

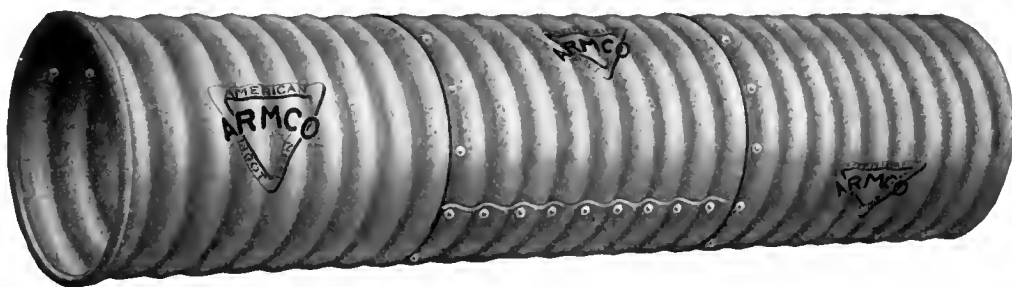
### Cost Less per Year

than any other type of construction you can use to drain your highways and railroads.

Don't figure the cost of *Culverts*.

Figure the cost of their *service*—figure their reduction of replacements, washouts, etc.

Forethought of this kind results in the replacement of thousands of temporary or unreliable pipes and boxes with “Armco” Iron Culverts.



Resist Rust

Arkansas, Little Rock  
Dixie Culvert & Metal Co.  
California, Los Angeles  
California Cor. Culvert Co.  
California, West Berkely  
California Cor. Culvert Co.  
Colorado, Denver  
R. Hardesty Mfg. Co.  
Delaware, Clayton  
Delaware Metal Culvert Co.  
Florida, Jacksonville  
Dixie Culvert & Metal Co.  
Georgia, Atlanta  
Dixie Culvert & Metal Co.  
Illinois, Springfield  
Illinois Corrugated Metal Co.  
Indiana, Crawfordsville  
W. Q. O'Neill Co.  
Iowa, Des Moines  
Iowa Pure Iron Culvert Co.  
Iowa, Independence  
Independence Cor. Culvert Co.

Write or phone the nearest manufacturer for full information on Rust-Resisting “Armco” Iron Culverts, Signs, Gates, Roofing and Formed Products.



Resists Rust

Kansas, Topeka  
The Road Supply & Metal Co.  
Kentucky, Louisville  
Kentucky Culvert Co.  
Louisiana, New Orleans  
Dixie Culvert & Metal Co.  
Maryland, Munsey Bldg., Baltimore  
Wm. M. Baker.  
Massachusetts, Palmer  
New England Metal Cul. Co.  
Michigan, Bark River  
Bark River Bridge & Cul. Co.  
Michigan, Lansing  
Michigan Bridge & Pipe Co.  
Michigan, Bay City  
U. S. Bridge & Culvert Co.  
Minnesota, Minneapolis  
Lyle Corrugated Culvert Co.  
Minnesota, Lyle  
Lyle Corrugated Culvert Co.  
Missouri, Moberly  
Corrugated Culvert Co.

Montana, Missoula  
Montana Culvert Co.  
Nebraska, Wahoo  
Nebraska Culvert & Mfg. Co.  
Nevada, Reno  
Nevada Metal Mfg. Co.  
New Hampshire, Nashua  
North East Metal Culvert Co.  
New Jersey, Flemington  
Pennsylvania Metal Cul. Co.  
New York, Auburn  
Pennsylvania Metal Cul. Co.  
North Dakota, Wahpeton  
Northwestern Sheet & Iron Wks.  
Ohio, Middletown  
American Rolling Mill Co.  
The Ohio Corrugated Cul. Co.  
Oklahoma, Shawnee  
Dixie Culvert & Metal Co.  
Oregon, Portland  
Coast Culvert & Flume Co.

Pennsylvania, Warren  
Pennsylvania Metal Cul. Co.  
South Dakota, Sioux Falls  
Sioux Falls Metal Culvert Co.  
Tennessee, Nashville  
Tennessee Metal Culvert Co.  
Texas, Dallas  
Wyatt Metal Works  
Texas, El Paso  
Western Metal Mfg. Co.  
Texas, Houston  
Lone Star Culvert Co.  
Utah, Woods Cross  
Utah Corrugated Culvert & Flume Co.  
Virginia, Roanoke  
Virginia Metal Culvert Co.  
Washington, Spokane  
Spokane Cor. Cul. & Tank Co.  
Wisconsin, Eau Claire  
Bark River Bridge and Cul. Co.

CANADA—Canada Ingot Iron Co., Ltd., Guelph, Sherbrooke, Winnipeg, Calgary

# No Loss of Revenue from Counterfeiting with these Metal Tickets



These perforated tokens require a very heavy coining press and expensive dies for their manufacture, making it so difficult to counterfeit them that it doesn't pay to do it.

Vastly superior to paper tickets and big time savers to the conductor and passenger alike.

## Johnson Metal Tickets and Johnson Fare Boxes

are the ideal systems of fare collection for your cars.

The tickets are counted and registered in accordance with their value together with the cash fares by the Johnson Fare Box.

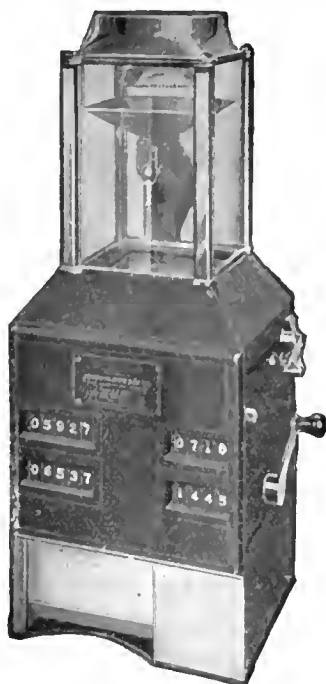
After registry they become immediately available for re-sale.

The success of this system has been absolutely demonstrated by the increased earnings that resulted after its adoption by leading railway companies, among whom the following are represented:

Dallas Railway Co., Dallas, Tex.;  
Public Utilities Company, Evansville, Ind.;  
Mobile Light & Railroad Company, Mobile, Ala.;  
Denver Tramway Company, Denver, Colo.;  
United Railways Company of St. Louis, St. Louis, Mo.;  
Milwaukee Electric Railway & Light Company, Racine, Wis.

Let us solve your problem of fare collection and fare accounting.

We will furnish full details. Write.



**Johnson Fare Box Company**  
Jackson Boulevard and Robey St., Chicago  
50 East 42nd Street, New York



# Reduce Work on the Car to a Cashier Service

*By Using*

**National Pneumatic Door  
and Step Control**

The women conductors on the Broadway stepless cars are giving courteous, able and popular service.

The use of National Pneumatic door control on the world's busiest cars has made it possible to make so satisfactorily the change to women employees—

the operator can sit within a railed inclosure from which she operates the doors through remote control.

Her job is as free from disagreeable environment, and as simple as that of a restaurant cashier.

You can introduce this condition on your present airbrake cars at little cost. Just ask us for figures.

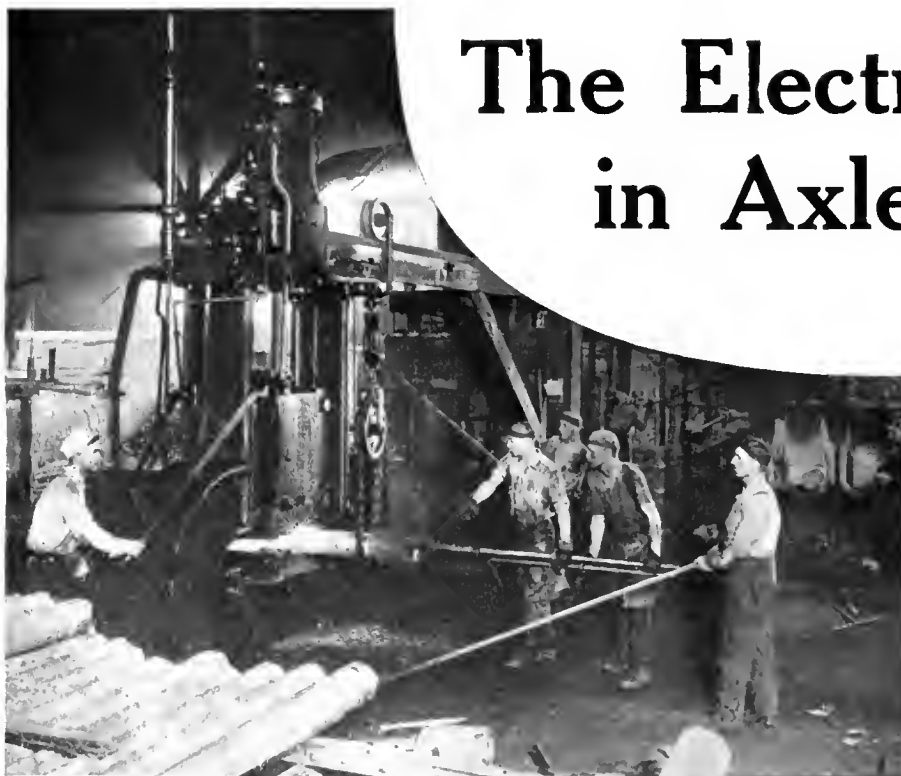
## NATIONAL PNEUMATIC COMPANY

INC.

50 Church St. New York

515 Laflin St. Chicago





# The Electric Furnace in Axle Making

—how it insures greater  
strength and wearing  
qualities in "*Electroheat*"  
Axles

"Electroheat" Axles in the making: One of the steam hammers performing the thorough forging operation that precedes the Electric Furnace Heat Treatment

**A** PART from the forging of a steel that is free from seams, pipes and segregation, the most important step in the manufacture of good axles is *heat treatment*!

The object of heat treating is to combine the greatest possible resistance to breakage and bending with good wearing qualities. It does this by bringing about an increase in strength and toughness through a molecular rearrangement of the chemical contents of the steel and the refinement of its entire structure. The success of the operation, however, depends upon the intelligent application of heat at certain precise temperatures.

So the question of the *process* is a vital one in producing heat-treated axles of uniform quality. And that is why "Electroheat" Axles are heat-treated electrically.

The electric heating furnace gives posi-

tive automatic temperature control. Its operating precision is as strong in contrast to old-time methods of heat treating by fuel furnaces as the "Electric Melting Furnace" is to the Bessemer Converter. With it the entire process of annealing, or quenching and tempering "Electroheat" Axles is carried forward under the *exact* desired heat *uniformly* applied. Uniformity in results with maximum strength and toughness are therefore a scientific certainty!

That's what you buy in "Electroheat" Axles. They *have* to give better service!

**Note: "Electroheat" Armature Shafts possess the same torsional and shock-resisting qualities as "Electroheat" Axles, being heat treated by the same process. They minimize service breakdowns and maintenance costs.**



"If Heat-Treated Electrically—It's a VALSCO"

# LACLEDE STEEL COMPANY

General Offices—Federal Reserve Bank  
Saint Louis, Mo., U. S. A.

# The Rim Is Hard and Tough



DAVIS  
STEEL  
WHEEL

That is why  
multiple-wear  
mileage is equal-  
led in one wear  
by the Davis  
Steel Wheel.

American Steel  
Foundries  
1105 McCormick Building  
CHICAGO

# *It Interests the Motorman Intensely*

## The Arthur Power-Saving Recorder



Shows how many minutes the Power is on.

Counts how many stops and slowdowns are made.

You want the motorman to shut off the power as soon as possible and run with power shut off for as long as possible. This is the economical and safe way to run a trolley car. *The upper dial encourages the motorman to do this.*

Then again, you want motormen to avoid running at too high speeds, to coast along cautiously and avoid running too close to the car ahead; to stop "fanning the air" when making a stop, and avoid making unnecessary stops and slowdowns. *The lower dial encourages this kind of operation.*

From such a record the Company can determine exactly how efficiently and safely each motorman is operating in comparison with every other motorman on the same line—and the motorman can see for himself exactly what sort of record he is making and how and to what extent he is improving that record from day to day.

The great big value of any device for checking the use of power and increasing safety, rests in securing the full interest and cooperation of the men. The Arthur Recorder does this in a very simple and effective manner.

**The Arthur Power-Saving Recorder Co.**

Second National Bank Building, New Haven, Conn.

*"Power wasted is the true measure of the motormen's relative efficiency"*



When Indiana was admitted as a State into the Union in 1816, its people decided to have their capital built to order in the exact geographical center of the State. Indianapolis was the result, and when the first State Legislature met therein "the city" boasted of a population of 600 people.

Washington Street, Indianapolis, 1872

## The Made-to-Order Capital

proved a wonderfully active and progressive community. Although greatly hampered in the beginning by poor means of transportation, its citizens weathered the great financial panic in 1837 and plunged into railroad building as soon as the first *practical* locomotives were constructed.

Today Indianapolis is one of the greatest railroad centers in the entire world. Practi-

cally every transcontinental line—East, West, North, South—crosses Indiana and visits its capital. It boasts of 32 interurban lines radiating from its center with more than 1600 miles of track.

All of which goes to prove that with enough courage, persistence and a reasonable allowance of "luck" even a great State capital may be successfully made to order. With these factors

## Galena Oils

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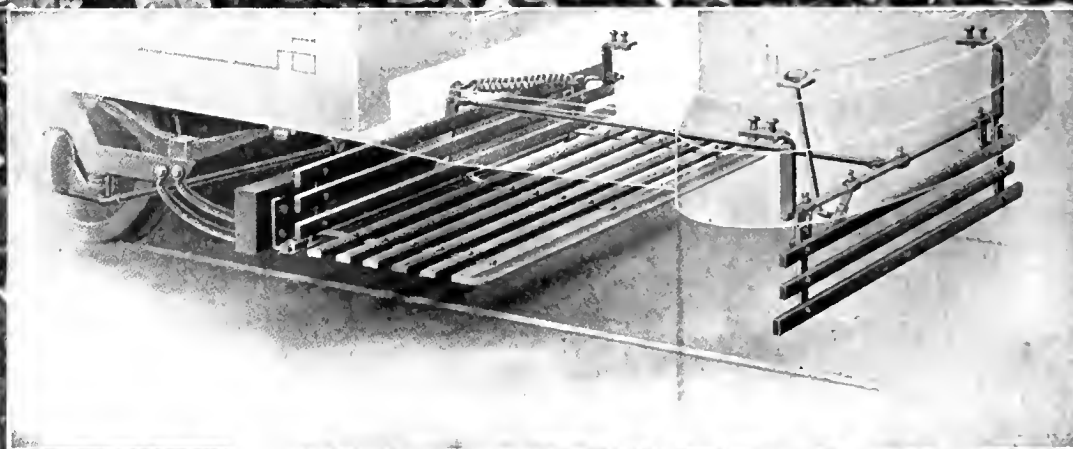
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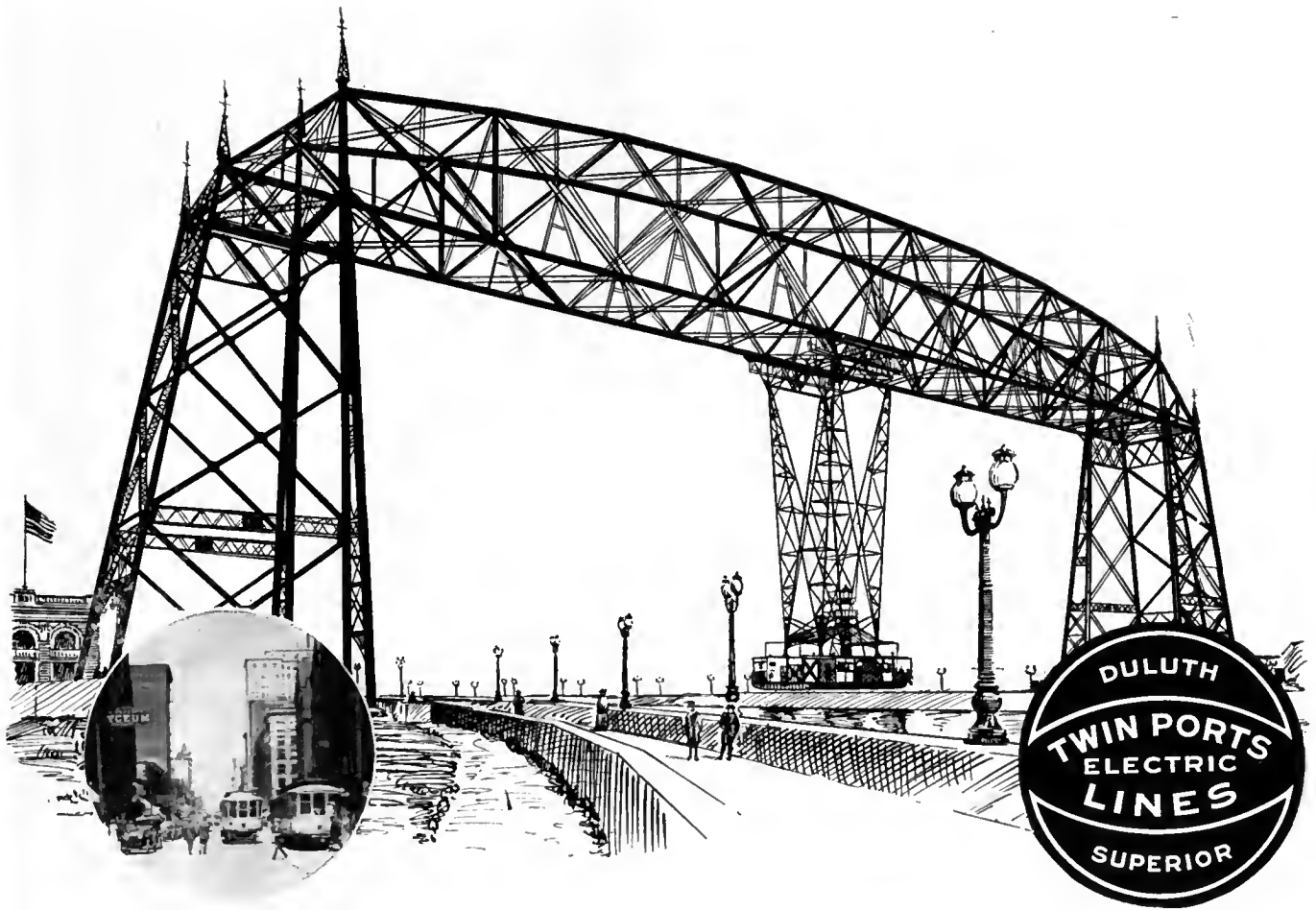


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# Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 51

New York, Saturday, April 27, 1918

Number 17

## The October Convention

The American Electric Railway Association will hold its annual convention at Atlantic City this year. The dates selected are

**Tuesday, Wednesday and  
Thursday,**

**Oct. 8, 9 and 10**

and there will be meetings of the affiliated associations at the same time and place.

In view of war conditions there will be no exhibits.

## A Challenge from the Rhode Island Company Section

IN THE FLUSH of victory after a remarkably successful campaign to organize a company section with a record-breaking charter membership, employees of the Rhode Island Company, Providence, R. I., have issued a challenge to other companies to try to beat their achievement. In order to give added force to this challenge the ELECTRIC RAILWAY JOURNAL will present an appropriate cup to the section which meets the terms of the challenge, for the present no restriction as to date being set. It is the hope of the editors, however, that the cup will be called for soon. There are many companies in the country which could furnish more than 200 charter members for a section if they went about it in the same spirit as that manifested at Providence. As we have pointed out before, now is the time to organize sections because if they are needed in times of peace they are more needed in times of war. The enthusiasm of the Rhode Island Company section needs to be seen to be appreciated fully, but if maintained it will furnish the motive power for many a patriotic movement. With true missionary zeal the new section wishes to see the good work spread. We hope it will not be disappointed.

## Pennsylvania Railroad Adds New Link in Electrification Chain

THERE was nothing particularly exciting in the inauguration of electric service on the Chestnut Hill branch of the Pennsylvania Railroad at Philadelphia. This is true both from the technical and transportation standpoints. While not exciting, however, the event was no less significant, as a moment's consideration of the matter will show.

In the first place, within a few days after the overhead construction was made "alive," the full passenger train service was in operation. There was no preliminary or probationary period of operation. As soon as the train crews could be "broken in" on their new duties they were given their trains and began their new work without ceremony or hesitation. Thus will be a large part of the spread of electrification throughout our country. This fact was illustrated by the lack of sensation when the St. Paul Railway announced last year that it would extend by several hundred miles the electrification on its transcontinental line.

The point in all this is that while heavy electric traction apparatus is by no means standardized and possibly never will be, it has demonstrated its reliability to such an extent that there need be and is no hesitation in the electrification of track which, from economical considerations should be so equipped. A further significant fact is that after several years of experience with the equipment on the Paoli division of its main line between Philadelphia and Pittsburgh, the Pennsylvania Railroad made only minor changes in rolling stock and overhead construction, when electrifying its Chestnut Hill branch. This is added evidence of reasonable permanency in design standards.

It is true, a number of minor changes were made as a result of a more thorough understanding of the operating requirements. These, however, in no way interfere with the interchangeability of rolling stock between the two local lines.

In many ways the Pennsylvania Railroad is directly and indirectly doing as much for electrification as any railroad in the country. The Long Island Railroad was one of the first important electrifications in the world and on this and the New York terminal of the line from the South, the Pennsylvania Railroad is having valuable experience with low-voltage direct-current electrification. The railroad is also greatly interested in the single-phase system. It has a large sum of money invested in the New York Connecting Railroad which, while it will be operated by the New Haven, can properly be considered a part of the Pennsylvania System. It has also financial interests in the Norfolk & Western

Railway where the single-phase transmission system, with polyphase motors on the locomotives, has been employed successfully for very heavy haulage.

Logically in line with the Norfolk & Western electrification the railroad is experimenting with a locomotive of the same general type, but differing in details, for its Altoona division on the main line. At the Philadelphia terminal the single-phase system with motors of series characteristics is working out well. Taken all together then, it must be granted that this great railroad system is doing much in and for electrification progress. Like the grapefruit tree on which can be found at the proper season fruit in all stages of maturity, so here we find at one end the Long Island electrification seasoned by many years of efficient operation and at the other the Altoona division locomotive, still subject to certain modifications before final adoption.

### **Boston Relief Provisions Are Worthy of Enactment**

**A** TRULY remarkable bill—such seems to be the character of the Boston Elevated measure filed by the joint committee on metropolitan affairs and street railways of the Massachusetts Legislature. Not all the features are novel, but the old has been improved and the novel is progressive.

In considering the bill, which was outlined in last week's issue, we shall exercise our judgment in general along broad lines, for the details are more subject to change before enactment. The bill has two main objects in view—the rendering of adequate service at cost, and the exercise of public control over operation.

As for the cost-of-service idea, the plan of a flexible fare, variable at short intervals in accordance with the fluctuations of a reserve fund, is not untried. The Cleveland Railway operates upon this basis. The Boston plan, however, provides for two noteworthy changes. In the first place, the fare schedule would be neither limited nor fixed; the public trustees would be required always to have at least four grades of fare above and below that in force, and they might regrade the schedule or change the fare basis as they saw fit. Secondly, instead of requiring the company to carry a reserve deficiency until made up from higher fare returns, the State semi-annually through its taxing power would meet any such loss, subject to reimbursement from fares. These provisions make better allowance for future contingencies and afford more sound support to the credit of the company than, for instance, do those in the Cleveland plan.

The distinctly novel feature of the bill is the creation of a board of five public trustees, three appointed by the Governor and two by the Mayor of Boston. This body would do no less than assume for at least a ten-year period the managing and operating powers of a board of directors and the rate-fixing and service-regulating powers of the Public Service Commission. A bold move? Perhaps, but this is no time for half-way measures of relief. The Boston transit situation from a financial point of view demands potent measures, even if they are unprecedented.

Not that we believe the public trustees would because of inherent virtues secure any better results than

the directors and the State commission—most emphatically we say not. Blessed with the same flexible-fare plan and the same tax support, the existing bodies would accomplish as much as the trustees. But the public might be suspicious. They could be won over, but the public trustees would probably secure full public confidence more quickly than could a private board of directors. For the sake of time-saving in a critical period, therefore, the plan of public control deserves trial. A word of caution, however—the plan must be good in practice as well as in theory, and a \$5000 salary seems too small to attract trustees big enough for their jobs, if they are to give all their time to the work.

Should the continuance of the system of public control prove undesirable, the bill permits a return to private control at the end of ten years, or thereafter upon two years' notice. The service-at-cost plan, however, would not be abolished but would be carried out by the company under public regulation. Such a clause was to be expected. Any lack of provision for the future scientific determination of fares would be criminal folly on the part of the Massachusetts legislators.

The proposed bill seems fair to both stockholders and the public. The stockholders would, it is true, lose one-eighth of their return in the first four years, but perhaps full justice is not possible overnight in these days, no matter how desirable. The company's precarious financial condition would be remedied, and the public would have good service at a reasonable price. The measure represents constructive effort, and while some details might be changed to advantage the suggestion, to speak broadly, promises needed results if enacted into law.

### **Electric Railways and the Thrift Stamp Habit**

**E**LECTRIC railways can do a great deal to interest their employees in the habitual purchase of thrift stamps by utilizing the several means of communication between the management and the men. Those companies that have organized company sections of the American Electric Railway Association have a splendid machine already at hand. The appointment of thrift stamp committees would be a logical step. Many companies have welfare departments, many issue publications primarily for employees, all companies have bulletin boards galore scattered over their properties, etc. All of these things can be utilized provided that one or more men in the organization has an overpowering conviction of the importance of this matter and is willing to let this conviction work itself out in natural channels. There is no doubt that many railway companies have worked out W. S. S. plans which meet their needs. For example, as noted in the news columns of this paper last week, the New York Railways and the other roads in New York City are working under the auspices of the national war savings organization. Stamps are being sold in general offices, employees' stores, recreation rooms, storekeepers' offices, etc.

The idea of utilizing conductors for the sale of thrift stamps have been advanced, but it seems to be impracticable. The conscientious conductor has enough to do now without adding to his burdens. Moreover, the number of places where stamps can be obtained is so great



that it would seem to be unnecessary to add to it. What is most needed is educational work to impress upon everyone the fact that it is not only a patriotic duty to purchase securities to finance this war, but that if it is not financed through loans it will be financed through taxation. The fact that educational work is needed is shown by the slowness with which the Third Liberty Loan has gone so far. As a nation we have not yet waked up to the fact that we are at war. Electric railway organizations should do their share and more than their share in awakening their country to the real situation.

### It Won't Hurt to Disclose Your Savings

**A**N ICEBOX is no good to an Esquimau, nor concealment of figures to a public utility operator. Quite recently we learned that a certain railway, by installing car-checking devices, had saved thousands of tons of coal and tens of thousands of dollars. When we suggested publication of these savings as an incentive to other railways, the manager raised his hands in horror and cried: "Please don't unless you want to queer our appeal for a higher rate of fare. The public would not understand that our other expenses have more than counterbalanced this saving." As he had shown us these savings in confidence we had to yield to him though we certainly did disagree with his line of reasoning.

Like objection has been raised to publishing the financial results of the skip stop. In this instance less objection is offered to mentioning the coal saving itself, since that is held to prove patriotic obedience to the orders of the Fuel Administrator. Yet the railway manager seems to believe that he can conceal the fact that the skip stop also produces platform savings and other economies incidental to higher schedule speed. Why he should fear to tell the truth in these days of public service regulation and open accounting can be explained only on the theory that the "cover-up" habit has been transmitted from the Dark Ages of public utility financing.

No request for higher rate of fare is going to suffer just because the railway has frankly shown that even the savings resulting from the skip stop, the safety car or other economy has failed to absorb other higher necessary operating costs. On the contrary, most regulatory bodies are so well supplied with engineering advice that they are far more likely to delay relief to those companies which cannot prove that they have been operated economically. But when each and every record of savings made in the face of desperate conditions is put before them, they would have to be prejudiced indeed to deny relief.

Therefore, we urge every electric railway in the land not only to disclose its savings for the information of other operators, but also to publish the same figures as arguments with its own public. Let the people realize that the conscientious electric railway is doing all it can, whether alone or in co-operation with the municipality, to keep operating costs down in order to make any necessary fare increase as reasonable as possible. "Truth is mighty and will prevail."

### Police Power Is Ample to Permit Utility Progress

The way ain't sunny, but don't you fret;  
Cheer up, honey, you'll get there yet!

**T**HIS is our message to electric railways in answer to the disappointing decision of the New York Court of Appeals in the Rochester fare case. The damage to electric railways in the Empire State is enormous, but it is not irreparable unless the public has lost all sense of fairness, to say nothing of self-interest.

To electric railways in most of the other states the decision is not discouraging, for in analyzing the peculiar legal conditions in New York the court points out the general principle that commission-made rates are intended to supersede casual statutory rates, and even franchise rates in the absence of a constitutional limitation. Thus the Rochester decision is not national in scope, and the many states which are not handicapped with defective or outworn laws can continue to dispense justice to deserving utilities.

The Rochester decision is important to the industry as a whole, however, for it serves to delineate a trifle more clearly some fundamental issues in rate-making, and to point out the crass stupidity of legislatures and the general electorate in handling vital issues by implication rather than express language. According to the court's opinion, published in abstract on another page, the regulatory law in New York discloses no intention of the Legislature to deal with franchise rates.

Furthermore, although it is said to be improper to decide now how far the Legislature might go in altering franchise rates, the court remarks that the Constitution by requiring the consent of local authorities for utility operation recognizes cities as *pro tanto* independent of legislative control, even if the basic law contains no express provision for the irrevocable establishment of franchise rates.

The lack of a clear wording of the law is no worse, however, than the lack of vision on the part of the Court of Appeals. What is the police power of the State? It is the right of the State to compel the accomplishment of what is good, what is just, what is best for the people. It is a reserve power, not limited or annulled except by unmistakable words. It is the power that has made possible child-labor laws, compensation acts and workmen's insurance. It is the power which permits progress.

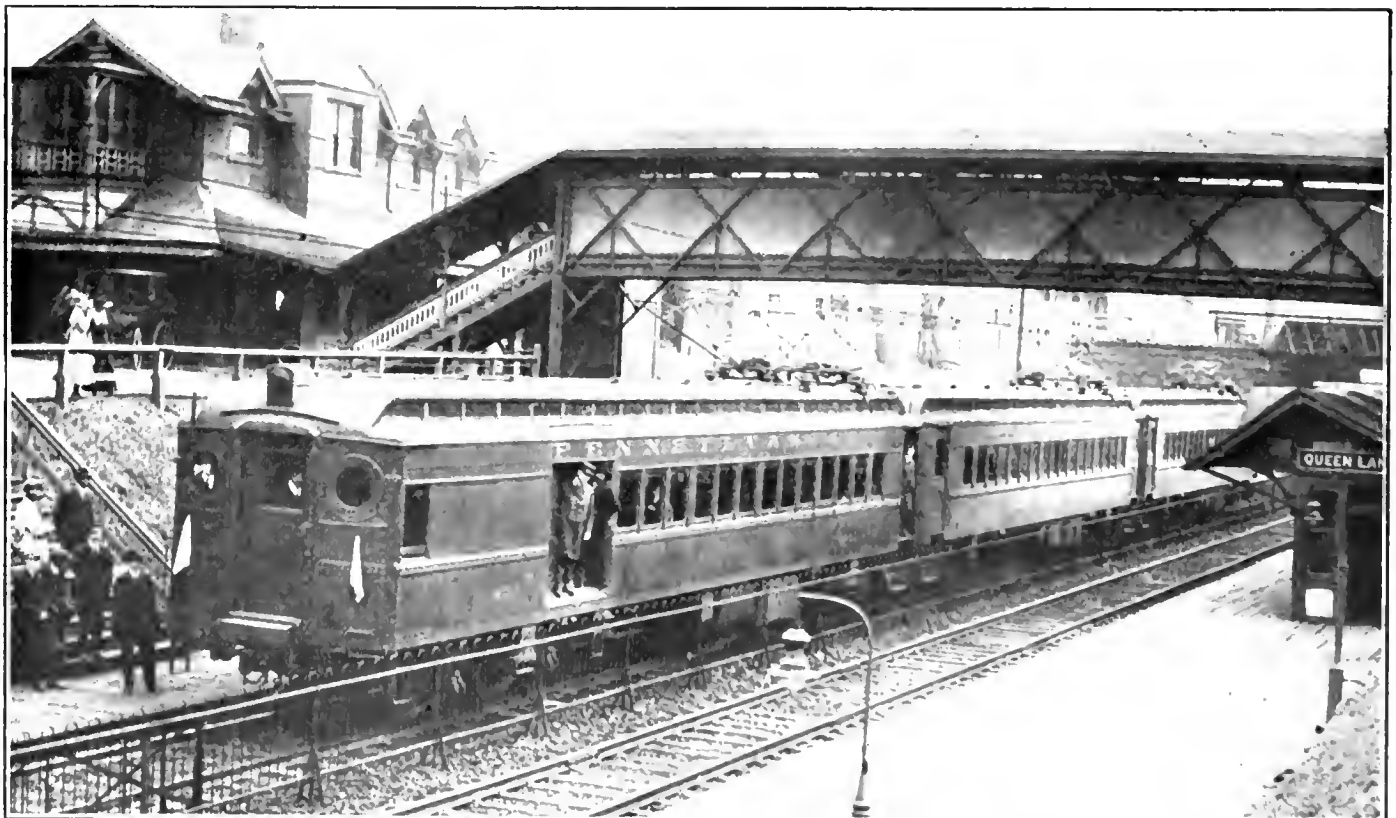
Times have changed since the New York Constitution, in 1875, was amended to provide in general language for the "consent" of cities to utility operation. Regulation has come; the theory of State paramountcy in rate-making is generally accepted—even the Court of Appeals recognizes this. Why not then, in the absence of an express contracting away of the police power, recognize the right of society to modernize rate-making in New York?

The New York commission law should be amended to provide for commission regulation of franchise rates. Such a law should be held valid. It will be, if higher judges recognize, as we are sure they will, the intent of the fundamental law to permit the state to develop in accordance with the spirit of the times when not actually forbidden, by its written word.



VIEW FROM SIGNAL BRIDGE AT NORTH PHILADELPHIA SHOWING TYPICAL METHODS OF CATENARY SUPPORT

*Characteristic Views on the Latest Electrification  
in the Quaker City*



FIRST SPECIAL ELECTRIC TRAIN ON CHESTNUT HILL BRANCH, PENNSYLVANIA RAILROAD



STATION AT NORTH PHILADELPHIA WHERE CHESTNUT HILL LINE BRANCHES OFF FROM NEW YORK LINE

## P. R. R. Extends Philadelphia Electrification to Chestnut Hill

Newly Electrified Branch Taps One of Best Suburban Sections of the Quaker City—Construction Shows that Overhead for Single-Phase Railway Lines Is Approaching Standardization—Outdoor Transformer Station a Feature of This Branch

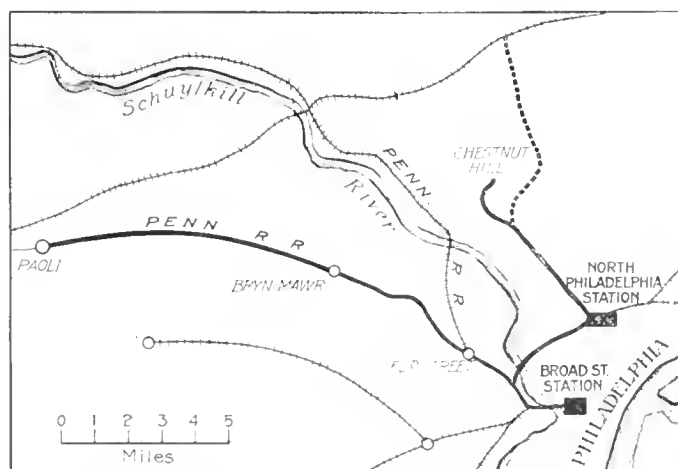
**A**BOUT three and a half years ago the Pennsylvania Railroad put into operation an electrified section 20 miles in length between Broad Street station and Paoli. Suburban service with multiple-unit cars only is given over this division, and the operation of the electric trains has proved to be very satisfactory. During the recent severe winter, in particular, the electrical equipment showed its capacity to handle traffic under adverse operating conditions. Soon after the completion of the Philadelphia-Paoli construction the electrification of the Chestnut Hill branch, 12 miles long between Broad Street station and Chestnut Hill, was begun. This work has now been completed and for the last few weeks the operation has been completely electric.

The Philadelphia-Paoli construction has been fully described in the *ELECTRIC RAILWAY JOURNAL*, particularly in an editorial article in the issue for Nov. 13, 1915, page 981, and in an arti-

cle by F. G. Grimshaw, then in charge of electric operation, in the issue for April 8, 1916, page 681. In general the Philadelphia-Chestnut Hill construction is similar to that of the earlier line, but there are a number of differences and these will be pointed out in the present article.

As from North Philadelphia to Chestnut Hill this line has only two tracks, whereas the Paoli section is a four-track line, the overhead construction is somewhat simpler between these two points. However, as the Chestnut Hill trains as far as North Philadelphia use the New York division tracks it was necessary to electrify a four-track line from West Philadelphia to North Philadelphia.

The twenty-two new cars, like the ninety-three older ones, are each equipped with two 225-hp. Westinghouse single-phase air-blast-cooled motors mounted on one truck. These are of a combined repulsion and series type, the repulsion

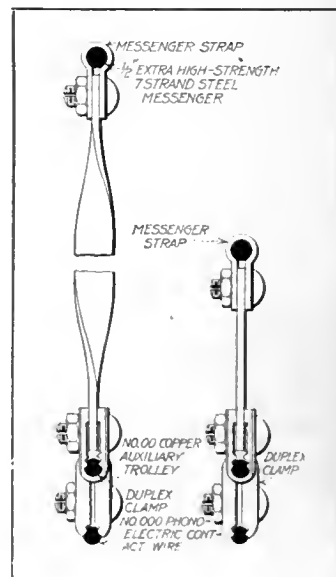
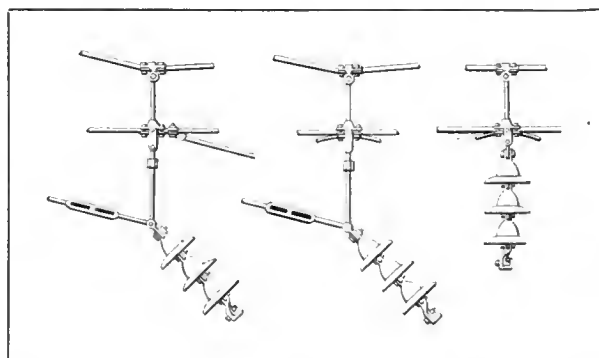


OUTLINE MAP OF ELECTRIFIED LINES OF PENNSYLVANIA RAILROAD AT PHILADELPHIA

principle being utilized in combination with the series principle in starting, the series connection alone being used above a certain speed. No resistance leads are used in the armature, compensation for undesirable transformer effects being provided by the arrangement of windings entirely. Details of the motor theory can be found in the first article previously referred to. The motors on the new cars are the same as those on the older ones, but modifications have been made in the control and in the other auxiliary apparatus.

As can be seen in the simplified wiring diagram on the opposite page, when compared with the diagram shown on page 982 of the issue of this paper for Nov.

With the diagram is given a table showing the sequence of switch operation on the several controller positions. These may be briefly reviewed as follows: The motor starts with partial voltage from the transformer secondary and with auxiliary fields, main fields and armatures in series. The armatures are also connected to a part of the transformer secondary independently, giving an equivalent of the 'short-circuit connection in the earlier motor. This is the "inverse-fed" connection. From the third position on the switch S



DETAILS OF MESSENGER SUPPORT ON CROSS-SPAN CONSTRUCTION, AND OF LONG AND VERY SHORT STRAP HANGERS WITH SECTIONS THROUGH WIRES



NEW STATION CUT AT HIGHLAND AVENUE, WITH SPECIAL HEAVY OVERHEAD CONSTRUCTION IN FOREGROUND. CROSSING UNDER CHELTON AVENUE, SHOWING METHOD OF ANCHORING INSULATOR SUPPORTS IN CONCRETE OF BRIDGE

13, 1915, reactance is used in place of resistance in controlling the current in the motor circuits. This change results in a smaller energy loss during acceleration.

Another difference is in the omission of the line switch, the equivalent protection against failures of the high-tension apparatus being afforded by means of the air-operated pantograph in conjunction with the excess-current and the no-current relays. For this automatic operation of the pantographs relays are connected into the high-tension circuits through instrument transformers, one to cause the pantograph to be pulled down in case of excess current in the secondary circuit, and the other in case of failure of voltage on the line.

is open, cutting out this extra armature circuit, the main motor circuit and the auxiliary field circuit being fed from different sections of the transformer secondary. This is the "doubly-fed" connection. The preventive coils, which are indicated by the vertical looped lines in the diagram, are connected in various combinations on successive controller positions in such a way as to limit the current to desired values.

When the armature is operating with short-circuit the motor is operating in part as a repulsion motor, giving it good starting characteristics. This repulsion, or inverse connection, is used up to 15 m.p.h. and it permits an acceleration of the rate of 0.85 m.p.h.p.s. on level track. From this point on to the full-voltage



series, or doubly-fed, connection the acceleration is 1.1 m.p.h.p.s. Full speed is approximately 60 m.p.h. on level track.

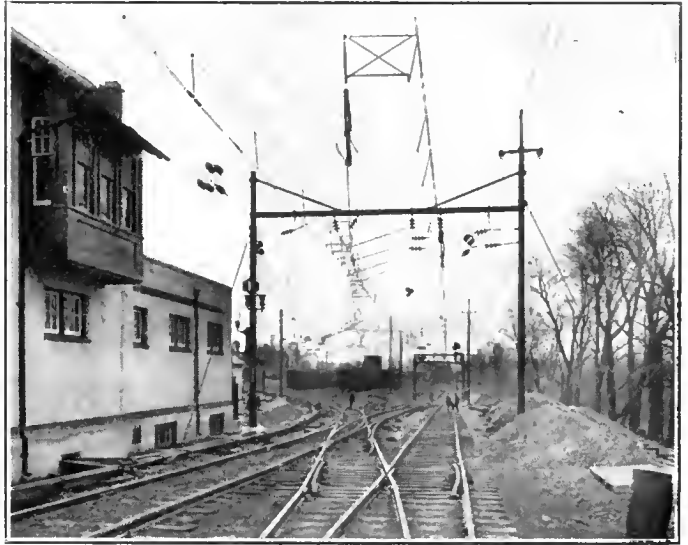
In the earlier cars the air compressor and the blower for cooling motors, transformers and preventive coils were driven from the same motors. In the new cars the drives are separate. The blower, which has a ca-

ing effect of wind blowing across the track, connect the two messengers. The contact wire is hung from the secondary messenger by means of bronze clamps.

The messenger wire is supported on insulators from overhead structures of several types, depending upon the characteristics of the respective parts of the line. Cross-catenary, bracket, or special-lattice-truss cross



CHESTNUT HILL YARD SHOWING LATTICED POLES SUPPORTING CATENARY STRUCTURE



CHESTNUT HILL YARD AND MAIN TRACK LOOKING TOWARD NORTH PHILADELPHIA

capacity of 6000 cu.ft. of air per minute at 5½ in. static pressure, is driven by a 7½-hp. motor. The compressor, which has a capacity of 25 cu.ft. per minute against 100 lb. air pressure, is driven by a 5½-hp. motor.

In connection with the control equipment, for the purpose of simplifying the interlock circuits which prevent the possibility of damage through incorrect operation of switches, a drum-type interlocking switch is used rather than separate interlocks on contactors. This operates in a manner similar to the standard PK control and greatly simplifies the unit-switch construction. These interlock circuits do not appear in the simplified general wiring diagram printed below. All of the control apparatus is placed around the edge of the car for ease of inspection and maintenance.

Practically no change has been made in the transformers except that an improved insulation has been used so as to increase the resistance to moisture.

In the earlier cars the lighting circuit was taken from taps in the transformer windings. Now a motor-generator set, used also for battery charging, supplies lighting current at 32 volts. The output capacity of this machine is 638 watts.

Like that on the main line the overhead construction on the Chestnut-Hill branch is of the familiar single-catenary type. From a steel catenary messenger hangs a secondary copper messenger parallel with the track. Hangers of strap steel, twisted to minimize the sway-

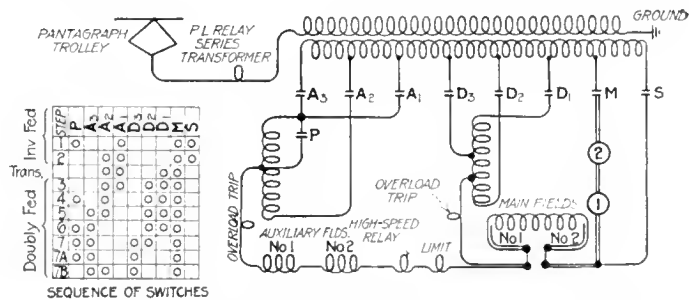
supports are used, depending upon the local requirements. Especial care was taken to design structures which would interfere with the views of signals as little as possible. Photographs have been reproduced to show characteristic methods of supporting the messenger wire.

Tubular construction with guys may be considered standard, but a variety of pole sizes was necessary in the interest of economy. Each pole was designed for its particular location, and butt diameters from 16 in. down to 9½ in. were utilized. In one of the photographs is shown a very high pole with the butt of the larger diameter mentioned. The supports used on the double-track, section between North Philadelphia and Chestnut Hill are mostly of the bracket type, with the brackets, or crossarms, built up of 4-in. channels placed back to back.

These are clamped close at the outer end and are spread out to surround the pole, being attached thereto by means of iron saddle clamps, one on each side, or forged steel bands. The poles are cross-latticed for stiffening. The bracket arms are braced by means of two steel sag rods. They

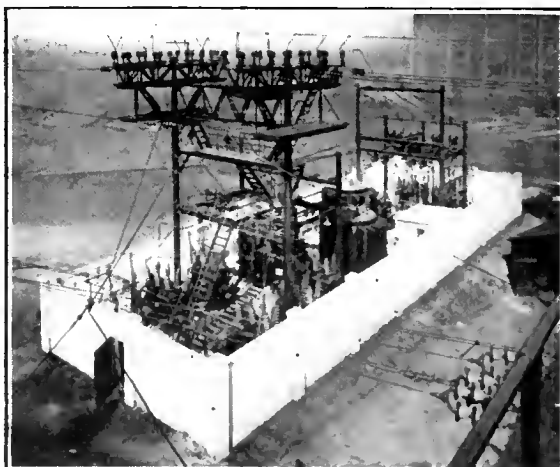
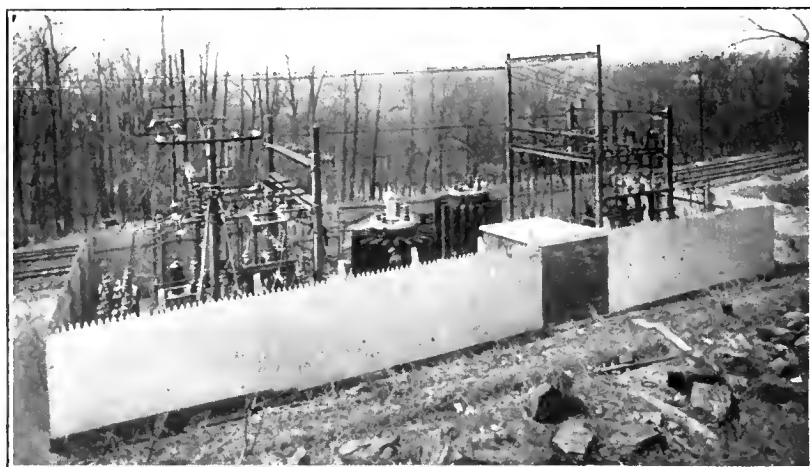
are extended on the side away from the track for the purpose of carrying two signal transmission wires.

To prevent swaying of the contact wire, on tangent construction, in heavy winds, a new steady brace has been developed. This consists of two wood stick insulators carried from the lower end of a rigid three-shell porcelain insulator clamped to the bracket



SIMPLIFIED ELECTRIC CIRCUIT DIAGRAM AND CHART OF SEQUENCE OF SWITCHING OPERATIONS





GENERAL VIEW OF ALLEN LANE TRANSFORMER STATION AND GENERAL VIEW OF NORTH PHILADELPHIA TRANSFORMER STATION

structure. From the lower end of the stick insulator, light metal rods are attached to the main messenger at the suspension insulator and to a clamp connecting the secondary messenger and the contact wire. These "steadies" as they are called are placed every three poles in certain locations and closer in exposed places to prevent swaying of the catenary in extremely high winds.

The main messenger is of  $\frac{1}{2}$ -in. double-galvanized seven-wire strand. It is of extra-high-strength steel, the breaking strength being 27,000 lb. and the elastic limit 60 per cent of this. Elongation is from 4 to 15 per cent in 24 in. This wire was furnished by John A. Roebling's Sons' Company. The wire in the cross spans is of  $\frac{3}{4}$ -in. strand, with nineteen wires, with the same general specifications.

In supporting the messengers three-shell suspension insulators, made by the Locke Insulator Manufacturing Company, similar to those used on the Paoli electrification are installed. A No. 00 grooved copper wire was used for the secondary messenger, clamped to the No. 000 grooved contact wire below. For the contact wire copper alloy (Phono-Electric) was used. Several drawings are reproduced to show the details of construction.

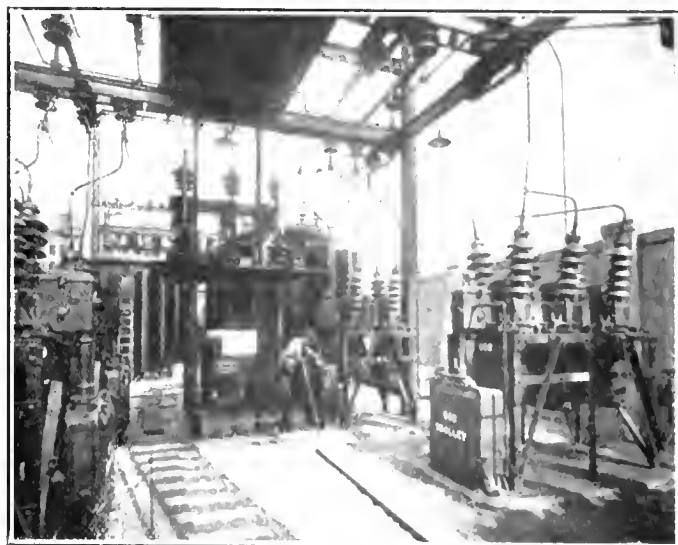
The section break used on the Chestnut Hill branch

as on the Paoli division is of the air type. This has been found to operate practically sparklessly.

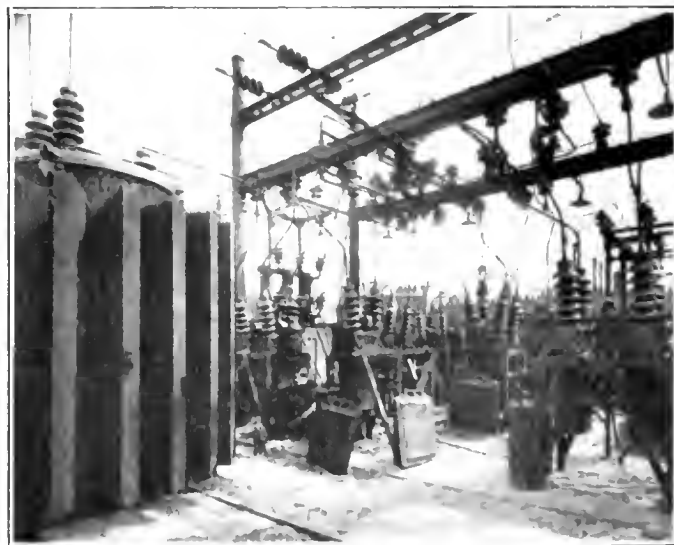
The transmission line wires are of aluminum and are carried on crossarms made of two angle irons, placed back to back, and attached to the poles above the catenary supporting bracket or other structure. The wires are carried on Locke pin-type insulators. At crossings under highway bridges the wires are carried overhead, not under the bridges as in the Paoli electrification. Restricted clearances make the location under the bridges impossible in many places and, while this is a more expensive construction it is easier to maintain the line when the overhead crossings are used. It also simplifies the matter of crossing foreign wires. At points of crossing streets and foreign wires special safety construction is provided at the insulators. Clamps are used to hold the wire, and plates are provided to take the arc in case of a break.

#### TWO OUTDOOR TRANSFORMER STATIONS ON THE CHESTNUT HILL BRANCH

Power for this electrification, like that for the Paoli section, is furnished by the Philadelphia Electric Company from its Christian Street power plant. The power is transmitted to the receiving substation at Arsenal Bridge at 13,200 volts, 25 cycles, and here the



INTERIOR OF NORTH PHILADELPHIA TRANSFORMER STATION LOOKING TOWARD 44,000-VOLT END



INTERIOR OF ALLEN LANE TRANSFORMER STATION LOOKING TOWARD 11,000-VOLT END

voltage is stepped up to 44,000. Three-phase-two-phase transformers are provided at this substation. The new load is normally carried on one of the phases and the Paoli load on the other of the two-phase circuit. This balances the load on the generators to better advantage. It will be remembered that special phase-balancing machines were required in connection with the Paoli electrification.

Two new 6000-kva. transformer stations have been provided, one at North Philadelphia, where the track branches from the line to New York, and one at Allen Lane, near the Chestnut Hill end. These new substations are of the outdoor type, in contrast to the indoor type used on the Paoli line. Power for the Philadelphia end comes partly from the West Philadelphia station, which also supplies part of the Paoli line. Photographs of the exterior and interior of both substations have been reproduced to show the general features of design, which are as stated briefly in the following paragraphs:

Each substation consists of three main sections. The first section contains the 44,000-volt apparatus, and is located at one end of the inclosure. The second section at the opposite end of the inclosure comprises the 11,000-volt equipment; while between these sections is the transformer and control section. The control equipment is housed in a fireproof structure at one side of the inclosure.

Two 44,000-volt transmission lines from the West Philadelphia substation enter the outdoor substation on a high steel structure. The feature of this is a group of Burke horn-gap switches which permit complete isolation from the high tension.

From these switches bare copper tubes or wires lead to a lower high-tension steel structure, thence to the electrolytic lightning arresters in series with horn gaps. From the arresters the circuits lead through the oil switches to the high-tension buses over the transformers. At the high-tension end of the inclosure are a potential transformer and an operating transformer for supplying switch operating power. The 11,000-volt end of the transformer station is provided with oil switches and lightning arresters like the 44,000-volt end.

On the switch structures the busbars are of copper tubing, but between structures solid or stranded copper wire is used. Both sets of buses are sectionalized in each transformer station, and in connection with the 11,000-volt oil switches provision is made to cut in resistance during the opening of the breaker.

#### DESIGN AND SUPERVISION OF CONSTRUCTION

The Chestnut Hill branch extension, like the Paoli line, was designed and the construction carried out by Gibbs & Hill, New York City, consulting engineers to the Pennsylvania Railroad.

The International Railway, Buffalo, N. Y., has placed in operation the first of its new all-steel interurban cars which were bought for the Buffalo-Niagara Falls line. These cars are being built by the G. C. Kuhlman Car Company. The total number to be supplied is forty. An illustrated description of these cars appeared in the issue of the ELECTRIC RAILWAY JOURNAL for March 3, 1917, page 378.

## Too Easy to Get Into the Union

**Union Membership Should Mean Special Ability—  
Discipline as Enforced in Boston by Joint Board  
—Promotion by Seniority Undesirable**

IN AN abstract on the report by John A. Beeler on the Boston Elevated Railways, published in the Feb. 9 issue of this paper, it was possible to summarize only Mr. Beeler's conclusions in regard to the equipment and corporate and financial conditions. He expressed also some interesting opinions on the labor situation and says that the labor union has possibilities which it does not realize. He continues:

"I am inclined to believe that it is too easy to get into the union. Practically the only qualification is employment by the company. Union labor has a great opportunity to develop a brand of quality that would be sought after by the public and by the companies; to make the word 'Union' synonymous with efficiency, courtesy, and good salesmanship, to create a demand for the particular product which they are able to supply. If this were done, representatives of the union would less frequently visit the office of the manager to present a brief for the petty shortcomings of some careless or incompetent workman. Instead, in the conduct of its internal affairs and by the application of its own standards of membership, the union would itself go far to prevent such occasions from arising.

"The company can help in this matter by doing everything in its power to remove all basis for the fear that discipline is being used as a means of undermining the organization. The important thing is that management and men should be able to meet on a common ground of co-operation in the work of the company, and that both should realize that courtesy, good nature and loyal, efficient work really pay. The men are naturally inclined this way, and only systematic effort on the part of the management and of their own leaders is needed to produce the desired results.

"When all employees are brought to a keen realization of the fact that they are part and parcel of one big Boston Elevated family better results are bound to accrue. The hearty co-operation of all the employees is as important to the success of the enterprise as any other one thing. Until it can be secured, neither men, company, nor public will enjoy the full benefits obtainable from Boston's transportation system.

"It is now generally conceded that organization of capital and of labor are both desirable if rightly used. Capital has perfected business organizations that are wonderfully effective. The most successful of these aim at maximum efficiency in the manufacture and marketing of the product and the improvement of its quality. By wise salesmanship, attractive advertising and the employment of affable, courteous representatives, demand is increased and the scope of operations enlarged.

"The methods which have proved their worth for capital are just as desirable for labor. It has been said that an impecunious street railway is a poor public servant. It is just as poor an employer. The men can in no way do more to further their own ends in the present instance than by doing everything in their power to help the company serve the public well and to conduct its affairs in the most efficient way. It is

perfectly natural and right for employees to desire to obtain full value for the work which they do, and that is why they have organized, but this is only the first step. The men will not gain the full benefit from the organization unless they use it as a means of improving the quality of their product and the effectiveness of the part which they play in the company's business."

#### DISCIPLINE AS ENFORCED BY A BOARD

Discussing the company's method of enforcing discipline by means of a discipline board, Mr. Beeler says: "This board is one of the unique features of the management. It is composed of four members appointed by the president and handles all cases involving labor disputes. The function of this board is to see that fair and just methods are uniformly practiced without fear or favoritism. Cases are brought to the attention of the board only in the event of the failure of the department heads to arrive at a satisfactory settlement with the employee.

"Discipline is adversely affected," Mr. Beeler goes on to say, "if the time elapsing between an offense and the decision of the board is not brief, as prompt decisions have great value in matters of this nature. In the meanwhile the employee involved should be suspended.

"Discipline is not what it should be," according to Mr. Beeler in another part of the report. "This lack is especially noticeable in carhouses removed from division headquarters. In some instances the division office is not even located at a carhouse. The division superintendents carry all the authority, and the station masters, who are in constant touch with the men, are little more than clerks. The division chief inspectors, who are virtually assistant superintendents, are also located at division headquarters, thus concentrating the authority that should be more widely distributed.

"There is opportunity for the improvement of co-operative action between the minor officials of the various divisions, when they realize that division lines should never stand in the way of the welfare of patrons, the company's interests or the responsibility of the employees. Opportunity also exists for marked improvement in the *esprit de corps* within the divisions. If it were possible for the officials and men to understand and see each other's side of the various phases of the operations, by giving closer attention to these matters, better results would follow, benefiting both men and management."

Mr. Beeler also points out that "the organization of the rapid transit lines is much better adapted to the maintenance of discipline than that of the surface lines, since the district supervisors, being located at the operating stations, should be in close touch with the men. Having the necessary authority and disciplinary power, they can command respect and obedience. The full measure of this is not in evidence at present, since the supervisors do not keep in sufficiently close personal touch with the men."

#### PROMOTION BY SENIORITY

Discussing the company's agreement with the union in regard to promoting men according to seniority, Mr. Beeler thinks that "the rule undoubtedly works to advantage for the platform employees. Here all men of a

given classification are engaged in the same kind of work, and it is merely justice to allow the senior man in service to have the pick of the available runs. In the shops and other departments the seniority rule does not give the same excellent results. The character of the work in different classifications differs so widely that promotion by seniority places men in positions that they are not qualified for. The tendency is to make the individual a 'Jack of all trades and master of none.' On this account the company is unable to give the same remuneration it would if the men could receive consistent training along one general line of work. True, a probationary period is provided for, but it is often difficult or distasteful to prove that a man is incompetent. To do this would require so much of the time of those in charge that their energies would be dissipated from the legitimate channels of their work.

"An instance will illustrate the condition. A man, for many years a carhouse foreman and shifter, in which position he did well, bid on a vacancy as pitman and was appointed. He was not adapted to the work and proved inefficient, but seniority required giving him a trial. Under the circumstances, it was difficult to prove him incapable, although he was plainly unfitted for this work. In spite of this fact he has twice since then been promoted, and is now in the highest paid class.

#### MERIT OR QUALIFICATION SHOULD GOVERN PROMOTIONS

"The remedy for this condition is to abrogate the seniority rule so far as it affects transfer from one craft to another, and provide for promotion by merit or qualification. This would not only benefit the men in the shops and carhouses, but be to the advantage of the platform men, who frequently have to operate equipment that has not been carefully adjusted."

In another section of the report on the subject of jitneys, Mr. Beeler claims that "one generally overlooked reason for jitney success that should be well noted by employees of street car lines is the fact that jitney operators are very largely working for themselves. To a certain extent they have in their own crude way studied the art of salesmanship. They are seldom surly or gruff. They want the money, and by various little acts of courtesy many of them have been quite successful. Affable and accommodating manners cost but little and mean much in the conduct of any business."

### Electric Locomotives Make Good Showing on Norfolk & Western

In the twenty-second annual report of the Norfolk & Western Railway, covering the year ended Dec. 31, 1917, the data of maintenance of steam and electric locomotives, covering repairs, retirements and depreciation, are given in terms of cost per 1000 tons hauled 1 mile. For the year 1917 this cost was 32 cents for the steam locomotives and 10 cents for the electric locomotives, as compared with 29 cents and 8 cents respectively for the preceding year.

The cost of freight movement in the electric zone during the month of October, 1917, when the conditions were normal, was stated to be 26 per cent less than if steam power alone had been used.

## New 50-Ton Electric Locomotive for Swiss Mountain Climbing

**A Narrow Gage Locomotive With Very High Rating Per Ton of Weight—Requirements Stipulated 11.2 M.P.H. on Heaviest Grade**

A NEW type of electric locomotive which presents some rather unusual features has been placed in service on the St. Moritz-Tirano Line of the Bernina Railroad in Switzerland. The demands made of the manufacturers, Brown, Boveri & Company, Baden, were exceptionally severe. The purchaser called for a locomotive capable of starting a 110-ton train on the most severe grades of this line and of maintaining speed of 11.2 m.p.h. on these grades. Moreover the weight per axle was limited to 8.6 tons (17,200 lb.). The length of the line is 23 miles, 16 $\frac{3}{4}$  miles having an average grade of 7 per cent, as well as numerous curves with a minimum radius of 131 ft. Power is drawn from an overhead contact line at 750 volts, direct current.

The motors on this locomotive are designed for use as generators on the down-grade trips, energizing the elec-

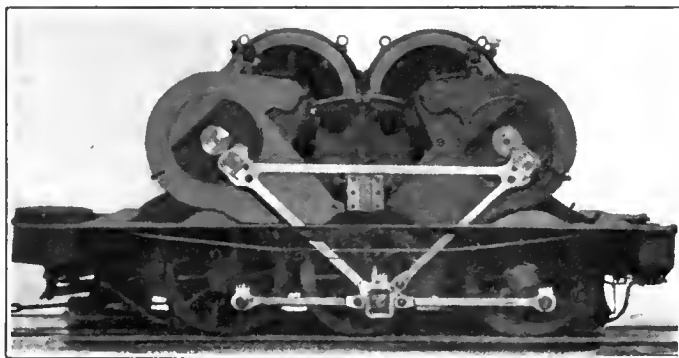


FIG. 3—MOTOR MOUNTING AND CONNECTING ROD DRIVE

original plan was therefore changed, and four motors of 155 hp. each were substituted to provide the desired low speed with all motors in series. The maximum speed of the train on level track is 31 m.p.h.

The details of construction are shown in the general views, Figs. 1 and 2. The central portion carries the track brakes, and is so arranged that it is always pulled by the leading motor truck but is never pushed by the following truck. It carries eight magnets capable of

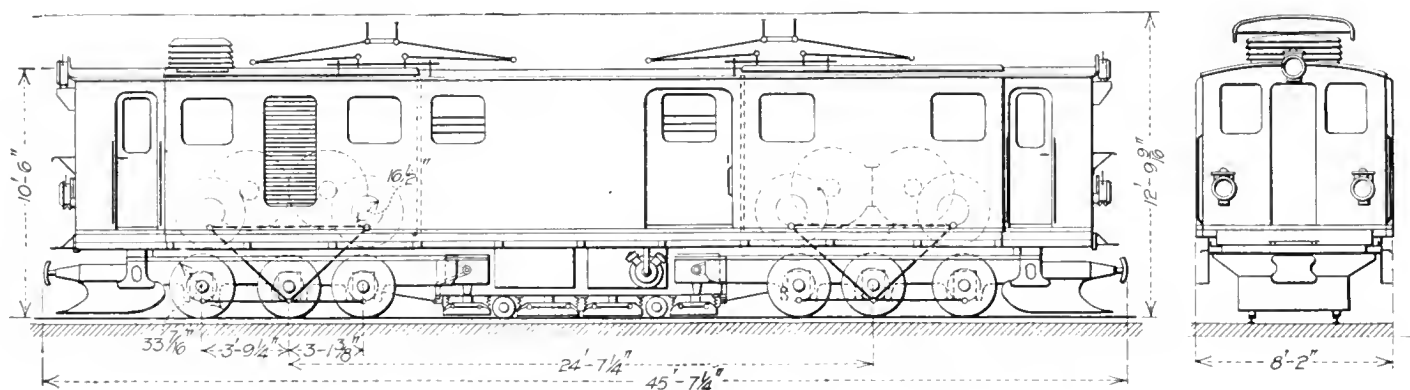


FIG. 1—GENERAL STRUCTURAL DETAILS OF LOCOMOTIVES

tric track brakes and providing rheostatic braking for the engines. The locomotive and cars are also fitted with Hardy vacuum brakes.

It was first attempted to use two motors of 310 hp. each for this service, but this was found undesirable as in winter it is necessary to use this locomotive as a snowplow and to operate it at very low speed. The



FIG. 2—LOCOMOTIVE HAULING 110-TON TRAIN

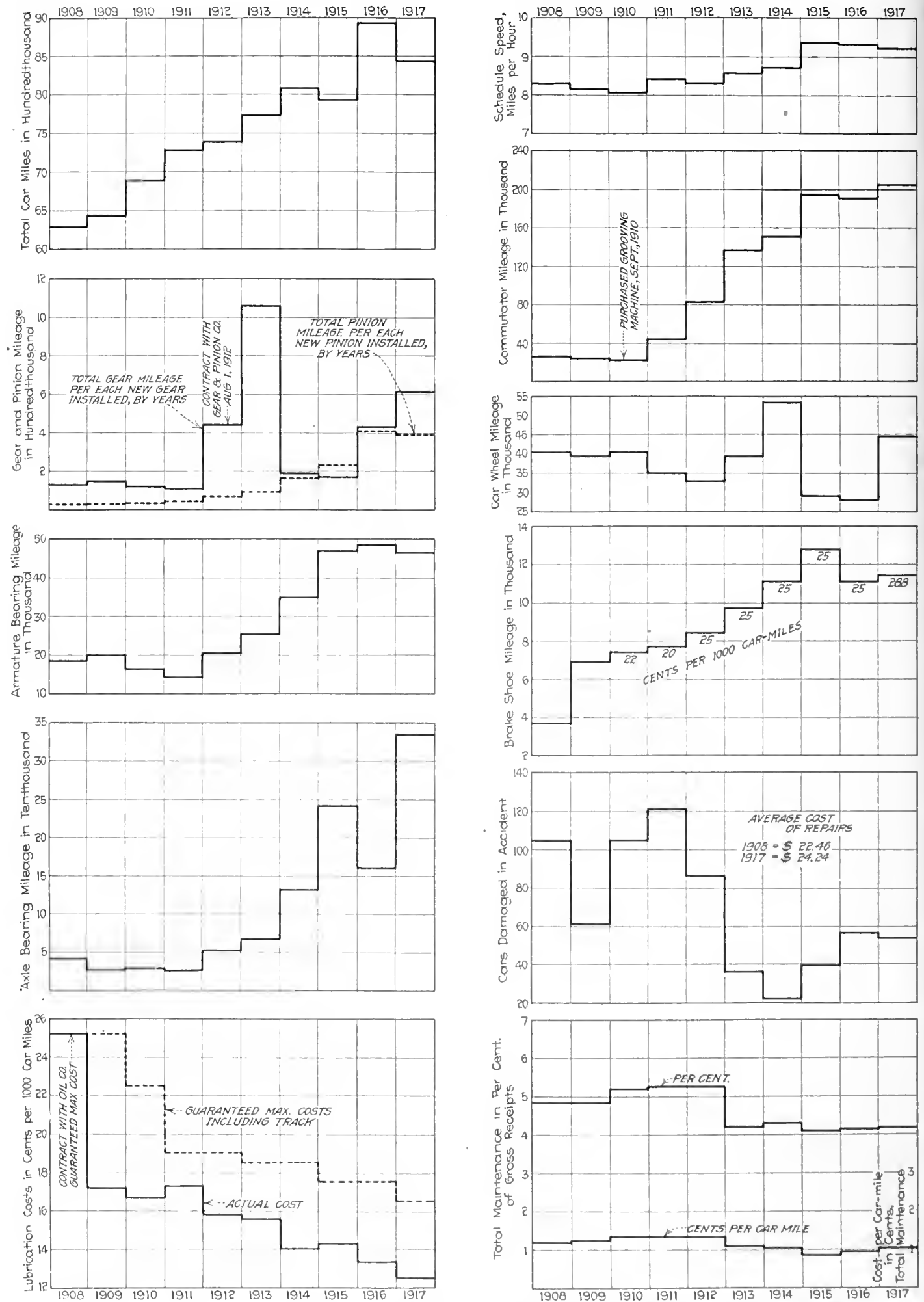
exerting a total vertical force of 45,760 lb. This system of braking the heavy engine on this road has proved very satisfactory, and despite the exceptionally trying conditions during the past winter not a single accident has occurred.

The motors are mounted in pairs on each truck as shown in Fig. 3. Each motor is geared to an intermediate shaft through gears with spring-mounted rims to absorb the shocks at starting. The power is transmitted to the driving wheels by means of connecting rods.

The locomotive, completely equipped with snowplow and all necessary equipment and tools, weighs 46.86 tons, of which 28.16 tons is the weight of the mechanical parts and 18.7 tons that of the electrical equipment. In the middle of the locomotive, between the two equipment sections, is a freight compartment of 3.3 tons capacity giving a maximum weight for traction of 50.16 tons.

In power per ton of weight this new engine is said to be the most remarkable of any of the narrow-gage type built so far. Its output on an hourly rating basis is 17 hp. per ton of weight. The gage is 39.37 in. (1 meter).

Further details of this locomotive are given in the issue of *Schweizerische Bauzeitung* for Feb. 23, 1918.



GRAPHS SHOWING ANNUAL RESULTS OF OPERATIONS OF EQUIPMENT ON MEMPHIS STREET RAILWAY  
(See left-hand scale of each figure for individual caption)



# Maintenance Records That Prove Invaluable

Memphis Street Railway Keeps Elaborate Records of the Performance of Its Equipment Based on Systematic Inspection—Efficiencies Checked Up Every Three Months—Tables and Graphs Show Comparative Results by Years

THE value of complete records of the operation and maintenance of the different parts of car equipment is indicated in the following outline of the method used by the mechanical department of the Memphis (Tenn.) Street Railway, of which A. D. McWhorter is superintendent of equipment and overhead lines. This company has prepared elaborate maintenance records, based upon careful and systematic inspections, covering a period of several years, and it is believed by the company that without question the results obtained entirely compensate for the work involved. In no other way than by recording the service secured can a check on the efficiency of operation be determined. This involves the compiling of a large number of data on an extensive property, but as will be seen from the methods used in Memphis, these can be arranged in very convenient form.

miles by the total number of car-hours, the latter being obtained on request from the auditor's office.

3. *Number of Cars Turned Out.* (a) *Machine Shop.* Figures obtained from the daily report turned in by motor and truck department foremen, and include all cars brought into the shop for repairs by motor and truck department. (b) *Carpenter Shop.* Figures obtained from carpenter-shop foreman's record of cars turned in and out each month and include all cars which received general repairs, repair on account of accidents, etc. (c) *Paint Shop.* Figures taken from monthly record of paint-shop foreman and include all cars brought in for regular painting, "touch-up" jobs, etc.
4. *Armatures Brought into Winding Room for Repairs.* These include all armatures removed from motors for bearing renewals, field repairs or for any other cause. When a motor is opened up the armature is taken to the winding room for inspection, where it is blown out and probably painted, string band is installed, etc. A separate entry is made for each type of motor, including compressor motors,

PASSENGER CAR EQUIPMENT											
Type and Service	No. Cars	Serial Number	Manufacturer	Date Built	Length of Body	Length Overall	Type of Truck	Brakes	Motors	Controllers	Seating Capacity
Single-Truck, Closed, Motor.....	38	107 to 144	Brill	1901	20 ft.	30 ft.	Brill 21-E	Hand	2 GE 800	K & K-2	Long 30
Double-Truck, Open, Trailer.....	19	700 to 718	Kuhlman	1905	13-bench	42 ft.	27 GE-1	Hand	—	—	Cross 56

FORM USED IN KEEPING DATA ON PASSENGER-CAR EQUIPMENT, MEMPHIS STREET RAILWAY

Some of the earlier methods used by the Memphis Company in keeping maintenance records were outlined and illustrated in an article published in the issue of the ELECTRIC RAILWAY JOURNAL for April 10, 1915, page 121.

As certain facts relative to the equipment should be borne in mind when considering the results obtained, the company keeps one record form filled in with data on all its passenger cars. This is shown in the blank reproduced in part on this page.

The maintenance record compiled in detail appears in tabular form as a "comparative statistical report of shop operation." This report is completed each year. The figures are entered for each month and a summation is made at the end of each period of six months and at the end of the year. Annual and semi-annual figures for the preceding year are also entered, together with figures to indicate whether there has been an increase or decrease with respect to each item. As one of these tables is too large to permit of reproduction, only a statement of the different items included are given here. These are listed as they appear in the table:

1. *Passenger Car-Miles.* Figures obtained from the statement of car-wheel mileage issued monthly from the auditor's office. Separate entry is made for each of the following: Single-truck, double-truck and maximum-traction-truck cars, double-truck trailer and total motor car-miles.
2. *Schedule Speed.* Obtained by dividing the total car-

and also of the total repairs made per month, armatures wound and fields used.

5. *Gears Used.* Classified according to the type of motor on which they were installed. Total monthly figures are also given and the average mileage of each for six months. Figures are obtained from the monthly statement of materials issued from the storeroom. The average miles are calculated by multiplying the single-truck and maximum-traction-truck motor car-miles by two and the double-truck motor car-miles by four, adding the product and dividing by the number of gears used during the period.
6. *Number of Pinions Used.* Same record kept as for gears.
7. *Commutators.* Number turned, as indicated from winding-room report, and average mileage of each for six-month period. The latter is calculated by multiplying the single-truck motor car-miles by two, the maximum-traction motor car-miles by three and the double-truck motor car-miles by five, adding the products and dividing by the number of commutators turned.
8. *Bearings Used.* (a) Number of pairs of armature bearings, taken from the daily reports of motor repairs, and an average mileage of each, which is obtained by multiplying the single-truck and maximum-traction-truck motor car-miles by two, and the double-truck motor car-miles by four, adding the product and dividing by the number of pairs of bearings used. (b) Number of axle bearings used. Also obtained from the daily report and the average miles, obtained by multiplying the single and maximum-traction-truck motor car-miles by four, and the double-truck motor car-miles by eight, adding the product and dividing by the number of axle bearings used during the period.
9. *Cost of Car Lubrication Per 1000 Car-Miles, in Cents.*

## Efficiency Report of the Memphis Street Railway, Mechanical Department

NOTE: Memphis & Lake View Ry. Co. Operation Included in this Report	CAR-MILES				CAR EQUIPMENT							Age, Years
	Month of December		Year to Date		Passenger Cars		Seating Capacity	Age, Years	Motors			
	1917	1916	1917	1916	Number	Type			Number	Type		
PASSENGER CAR-MILES												
Double truck motor.....	333,280	353,667	4,188,888	4,366,021	83	Closed Double truck, 4 motor.....	44	12	50	G. P. 201-I.....	3	
Max. trac. truck motor.....	82,635	99,518	1,122,045	1,168,797	25	Max. trac. truck, 2 motor.....	48	3	2	West. 101-B.....	5	
Single truck motor.....	185,550	218,429	2,567,329	2,822,343	11	Single truck, 2 motor.....	36	5	156	G. E. 80.....	11	
Double truck trailers.....	37,450	50,611	532,867	587,021	96	Single truck, 2 motor.....	30	16	154	G. E. 57.....	12	
Total passenger.....	638,945	722,225	8,411,129	8,944,182	25	Double truck trailers.....	54	4	144	G. E. 67.....	13	
SERVICE CAR-MILES												
Double truck motor.....	2,049	2,368	41,531	43,943	73	OPEN Single truck, 2 motor.....	50	14	264	G. E. 1000.....	18	
Single truck motor.....	1,439	787	16,453	13,027	19	Double truck trailers.....	54	13	16	G. E. 800.....	18	
Double truck trailers.....	184	645	6,902	5,227	332	Total.....			804	West. 69.....	18	
Single truck trailers.....		181	2,760	6,515						Total.....		
Total service.....	3,672	3,981	67,646	68,712		SERVICE CARS						
Total passenger and service.....	642,617	726,206	8,478,775	9,012,894					25	AIR COMPRESSOR		
Total motor-miles.....	1,880,564	2,061,608	24,333,330	25,648,190	9	Double truck, 4 motor.....			1	West. D-1-F.....	3	
Total air-brake-miles.....	417,964	455,553	5,352,464	5,578,761	10	Single truck, 2 motor.....			4	West. D-2-EG.....	11	
Total wheel-miles.....	4,392,980	4,932,060	57,484,032	60,740,764	7	Double truck trailers.....			38	Nat. Brake A-4.....	8	
Passenger car schedule, speed miles per hour.....	8.70	9.30	9.20	9.40	30	Single truck trailers.....			36	Nat. Brake AA-4.....	13	
					362	Total service cars.....			13	Nat. Brake AA-1.....	15	
						Total passenger and service cars.....			1	Nat. Brake B-2.....	13	
									122	Total air compressor.....		
									926	Total motor and air compr.....		

Service Performance of Material and Parts	MONTH OF DECEMBER						YEAR TO DATE						Remarks
	1917			1916			1917			1916			
	Units In- stalled	Service Mi. per Unit Installed	Cost per M Miles	Units In- stalled	Service Mi. per Unit Installed	Cost per M Miles	Units In- stalled	Service Mi. per Unit Installed	Cost per M Miles	Units In- stalled	Service Mi. per Unit Installed	Cost per M Miles	
Railway armatures, wound	1	1,880,564		1	2,061,608		34	715,686		23	1,115,139		
Air compor. armatures wound	0			0			16	334,529		12	464,900		
Fields, used	0			7	204,512		69	430,229		77	333,092		
Commutators, renewed	1	2,298,528		0			12	2,473,816		19	1,349,905		
Commutators, turned	8	287,316		9	229,067		145	204,729		166	154,146		
Gears, new	0			3	687,203		40	608,333		58	442,210		
Pinions, new	4	470,141		6	343,601		62	392,473		63	407,114		
Wheels, 33-in., oew	91			137			1033			1835			
Wheels, 24-in., new	8	36,305	1000	8	27,248	1000	58	44,630	1000	90	27,647	1000	Mileage guaranteed.
Wheels, 21-in., new	22			46			197			272			
Brake shoes, 25 lb. ea., new	188	11,322	31600	525	9,394	2500	5032	11,424	28856	5462	11,121	2500	
Armature bearings, pairs	36	52,238		34	60,635		522	46,616		525	48,853		
Motor bearings		752,226		22	187,419		144	337,962		312	164,091		
Journal bearings, lb. each, average	39	112,640		37	133,297		385	149,309		264	230,078		
Lubrication			1931			1603			1504			1669	
Trolley wheels, 4-in. copper	156	3,878		125	5,373		1943	4,085		1373	6,087		

Car Changes	MONTH OF DECEMBER				YEAR TO DATE				
	1917		1916		1917		1916		
	Number	Car-Miles per Change	Number	Car-Miles per Change	Number	Car-Miles per Change	Number	Car-Miles per Change	
Chargeable to carhouse	49	13,040	37	19,492	470	17,806	413	21,653	
Not chargeable to carhouse	26	24,575	30	24,074	164	51,287	131	68,265	
Total cars changed off line	75	8,519	67	10,779	634	13,267	544	16,439	

Payroll, Total Force, Acts. 29B-32-35-36-38-39-66	MONTH OF DECEMBER		YEAR TO DATE		
	1917	1916	1917	1916	
	Total number men on roll	107	119	110	117
	Average rate per hour.	2496	2324	2418	2259
Total amount of payroll.	\$7326.25	\$7529.50	\$85,955.85	\$84,749.10	

Maintenance of Cars and Equipment Cost	MONTH OF DECEMBER				YEAR TO DATE				
	1917		1916		1917		1916		
	Amount	Per M. C. M.	Amount	Per M. C. M.	Amount	Per M. C. M.	Amount	Per M. C. M.	
Superintendence, Act. 298.....	\$526.00	0.849	\$496.52	7048	\$5,833.78	0.713	\$25,192.94	0.5923	
Passenger cars, Act. 32.....	4,463.62	7.205	4,500.24	6.3883	61,113.03	7.475	62,930.74	7.1773	
Service cars, Act. 35.....	433.71	0.700	15.71	0.223	2,145.80	0.262	2,468.49	0.2815	
Elect. equipment, Act. 36.....	1,427.38	2.304	1,109.59	1.5751	20,465.75	2.503	16,452.43	1.8764	
Shop tools and mach., Act. 38.....	64.02	0.103	1.83	0.0026	541.51	0.066	207.71	0.0237	
Shop expense, Act. 39.....	584.14	0.943	279.76	0.3971	5,743.90	0.702	4,778.65	0.5451	
Total.....	\$7,498.87	12.104	\$6,403.65	9.0902	\$95,844.67	11.721	\$92,030.96	10.4963	
Memphis & Lake View Railway.....	203.46	10.000	217.51	10.0000	2,408.52	10.000	2,449.31	10.0000	
Total.....	\$7,702.33	12.051	\$6,621.16	9.3990	\$98,253.19	11.600	\$94,580.27	10.4894	
Buildings and structures, Act. 25B.....	87.06	0.141	236.84	0.3262	2,161.63	0.264	2,625.26	0.2912	
Carhouse employees, Act. 66.....	2,620.70	4.230	2,733.90	3.7695	30,248.90	3.700	28,854.10	3.2014	
Total.....	\$2,707.76	4.371	\$2,970.74	4.0957	\$32,410.53	3.964	\$31,479.36	3.4926	
R. & R. expenditure.....	None		None		None		None		Mchl. dept. only For all depts. For all depts.
R. & R. reserves.....	\$7,961.78		\$11,073.90		\$75,635.86		\$89,714.54		
R. & R. total bal. reserves.....	168,995.38		126,969.10						
Apportionment for maintenance and R. & R. reserve.....	13%		13%		13%		13%		

Data obtained from the monthly statement of lubricants consumed, issued by the auditor.

**10. Car Wheels Used.** Monthly figures obtained from the auditor's statement of car-wheel-miles and cost, and average mileage of each, which is figured from the total wheel-miles shown on the monthly wheel statement and the number of wheels used during the period.

**11. Trolley Wheels Used.** Same data as for car wheels.

**12. Brakeshoes Used.** Same data as for car wheels and in addition the monthly cost per 1000 car-miles.

**13. Cars Relieved.** Figures compiled from the daily report of cars changed on lines. (a) Those chargeable to carhouse with equipment failures. Separate reports are made of failures of different equipment as fender, mechanical air brake, electrical air brake, hand brake, wheel, circuit breaker, controller, motor, miscellaneous and monthly total failures. (b) Those not chargeable to carhouse, including cars relieved from service on account of accidents, for different type of equipment, etc., in fact all changes made over which the shop has no control. Separate entries are made under the following headings: Doors, accident, collision, split switch, trolley, broken glass, different type, no trouble, monthly totals which are not chargeable to carhouse, total number of cars changed, and cars off track.

**14. Cars Damaged in Accident, and Cost to Repair.** Costs are obtained from the auditor upon completion of the shop order which is issued covering repairs to car when damaged by accident or collision.

**15. Daily Average Number of Eighteen-Hour Cars for Both Single-Truck and Double-Truck Cars.** This item is calculated by dividing the total number of car-miles by the product of the schedule speed and the number of days per month times eighteen.

**16. Maintenance.** Average number of ten-hour men per day and cost per car-mile. Costs are obtained from the auditor's monthly statement, and the number of men by dividing the total number of man-hours per month by ten times the number of days in the month. These figures are entered quarterly and are made on separate accounts for maintenance of passenger cars, service cars, electric equipment and shop expenses.

**17. Total Maintenance.** In per cent of gross receipts, for a six-month period.

**18. Carhouse Employees.** Average ten-hour men per day. Record entered quarterly of number of men and cost per car-mile.

**19. Total Shop and Carhouse Force.** Figures are entered quarterly of the number of ten-hour men per eighteen-hour car-day and the average rate per hour. The former is obtained by dividing the total number of ten-hour men per day by the total number of eighteen-hour cars daily, and the latter by adding the rates of the entire payroll and dividing by the number of employees.

In addition to the comparative statistical report, an efficiency report is made out, the form of which is reproduced on the opposite page. It was developed in the beginning of the year 1917. It is in a large degree a duplicate of the report just outlined, but it is made up quarterly and is valuable in affording a means to check up frequently the operation and performance of various materials.

From the annual figures on the large comparative statistical report, graphs are plotted to show at a glance the result of operation over a period of years. Some of these are reproduced on page 806. These graphs are neatly drawn on 8½-in. x 11-in. sheets of cross-section paper and are kept on file in the superintendent's office.

## Portland Revises Merit and Demerit System

### Infractions of the Rules Are Divided Into Four Classes —A Tabulation Is Given of the Offenses in Each Class

ON JAN. 23, 1918, the Portland Railway, Light & Power Company, Portland, Ore., put into effect a revision of its merit and demerit system for transportation employees. The former schedule had been in use for a number of years. The new schedule classifies infractions of the rules in four divisions, according to the seriousness of the offenses.

Class A covers disregard of rules and regulations of the milder kind, carelessness and poor judgment. In such cases the attention of the offender is called to the error or omission by the inspector, superintendent or other person in authority. Repeated offenses in this class or any undue accumulation of various offenses in this class, indicating general negligence or indifference, are subject to reprimand by the division superintendent, and if the practice is continued subject the offender to suspension for one day. The list of offenses under Class A follows:

#### Class A

Punching transfers improperly.	Headlight on rear end.
Accepting transfers improperly.	No sander or fender pin.
Carelessness in filling out transfer envelope.	No pick-up rope or stick.
Failure to cancel tickets and transfers.	No link or pin.
Carelessness in taking out wrong transfers.	No car replacer.
Failure to announce car-destination or transfer points.	Failure to report car when storing in carhouse.
Incomplete peak-load report.	Power under circuit breaker.
Wrong train cards.	Rear fender down.
Signs displayed wrongly.	Sliding wheels.
Carelessness regarding ventilation.	Throwing switch from moving car.
Carelessness regarding heating car.	Too fast over special work.
Carelessness regarding lights.	Striking curves too fast.
Carelessness regarding signs.	Failure to test fender.
Conductor riding inside car.	Failure to sound gong.
Failure to keep car reasonably clean.	Failure to test hand brakes.
Failure to keep platform and steps clean.	Starting or stopping car with jerk.
Slouchiness in appearance.	Raindrops on window.
Rear curtain down.	Reversing motors unnecessarily.
Failure to report mail.	Carelessness regarding use of sand or sand boxes.
	Running with trolley off wire.
	Trainmen off duty talking with motorman.
	Failure to carry standard watch.

Class B covers the more serious and inexcusable infractions of the rules, regulations, etc. Offenses as listed in this class are subject to the following disciplinary procedure:

First time, caution by inspector.

Second time, reprimand by division superintendent.

Third time (or an undue accumulation of various offenses in this class), a minimum suspension of one day, the offender being also required to report to the superintendent of city lines who will consider the man's entire record and determine the disciplinary action to be taken.

While first offenses in this class are not entered on the individual's record at the general office, it is expected that cautions by inspectors will be respected by the men and accepted in the proper spirit. Inspectors, on the other hand, are instructed not to be arbitrary, over-

bearing or overzealous in the performance of their duties. The detailed offenses follow:

### Class B

Bunching fares.	Carelessness in handling of car.
Missing fares.	Passing at curve.
Taking wrong impression on register.	Passing on facing point of switch.
Leaving key in register.	Failure to make safety stop.
Keeping tab on register.	Abusing equipment.
Carelessness in making returns.	Carelessness in running through fog.
Failure to have necessary change.	Following leader too closely.
Failure to give proper signal.	Exceeding speed limit.
Failure to answer signal.	Carelessness when passing schools or fire stations.
Delay in leaving terminal.	Arriving at carhouse ahead of time.
Carrying passengers beyond destination.	Smoking while operating car.
Carelessness regarding car- ing for lost articles.	Incivility.
Failure to read notices.	Unnecessary delay.
Entertaining lady friend.	Failure to assist in blockade.
Using profane language.	Poor judgment in continually stopping for passengers when having a full load and followed by another car for same destination.
Ignoring transfer signals.	
Reading paper when car is running.	
Leaving car.	

All cases of a decidedly serious nature come under Class C. The procedure is that a thorough investigation is made, after which the findings are submitted to the superintendent of city lines, who brings up each case at the weekly meeting of division superintendents. If the trainman is found to be at fault the minimum suspension will be as noted in the list under Class C.

### Class C

Days Suspension	Days Suspension
1. Starting without signal.	3. Collision at crossing.
1. Giving signal too soon.	3. Collision at curve.
1. Starting on wrong signal.	3. Failure to flag crossing.
1. Derailing car carelessly.	3. Failure to stop at rail- road crossing.
2. Collision with vehicle.	3. Reckless running.
2. Running into open switch.	3. Irregular fare registra- tion.
2. Failure to report derail- ment.	3. Delay in filing accident report.
2. Backing into car.	6. Failure to report accident.
2. Disregarding rule on de- rail switches.	6. Running without permis- sion of superintendent.
2. Disregarding rule on bridges.	6. Disregarding rule on block signals.
2. Disregarding rule on switching back.	6. Disregarding rule on pro- tection of train.
2. Conductor riding on front end of car.	7. Rear-end collision.
2. Leaving ahead of time.	7. Head-on collision.
2. Running ahead of sched- ule.	10. Dishonesty.
2. Leaving car.	10. Refusing to obey order.
2. Running by passenger.	10. Inexcusable accident.
2. Allowing passenger to step from moving car.	10. Drinking.
3. Collision at switch.	10. Gambling.
	10. Unbecoming conduct.

The days of suspension have to be served at the foot of the extra list and not as a vacation, as the men are required to report once or twice a day without pay.

In addition to the classified offenses in the preceding three classes there is a fourth class, called Class D, which covers failure to report for duty. Failure so to report is penalized as noted below:

### Class D

Previous to 10.00 a.m., reporting within thirty minutes after the regular reporting time, one day at the bottom of the extra list.

Failure to report within thirty minutes after the regular reporting time, but reporting at the next designated reporting time, two days at the bottom of extra list.

Failure to report at the first designated reporting time

after having missed, but reporting at the second designated reporting time, three days at the bottom of the extra list. One day will be added for each regular and designated reporting time that passes thereafter until the man receives ten days, which will be sufficient cause for his removal from the list.

After 10 a.m. reporting within thirty minutes after regular reporting time, two days at the bottom of the extra list.

Failure to report within thirty minutes after regular reporting time, but reporting at the next designated reporting time, three days at the bottom of extra list.

Failure to report at the first designated reporting time after having missed, but reporting at the second designated reporting time, four days at the bottom of the extra list.

One day will be added for each regular and designated reporting time that passes thereafter until he receives ten days, which will be sufficient cause for the removal from the list.

No trainman is considered excused unless his name is marked off on the working list.

Of course, continued disregard of rules or orders, disloyalty to the company or to the country, dishonesty and other very serious offenses are considered sufficient cause for discharge.

As with other companies individual records are kept of the performance of the men, and each man is permitted to have an abstract of his own record.

## Welding Keeps Equipment Off the Sick List

R. L. BROWNE, engineer Metal & Thermit Corporation, presented a paper on welding with "thermit" before the New York Railroad Club at its meeting on April 19. The address was illustrated with lantern slides and moving pictures showing how machines of different types were welded and how the various processes of preparing the parts for welding, making the molds and preheating the members to be welded were carried out. Mr. Browne stated that the widest field for the application of this type of welding is found in the repairs to steam locomotives, but that electric railways are finding it very useful in rail welding. The greatest economies are produced in welding large parts, such as are used in connection with rolling mill equipment. Demonstrations of pipe and plate welding were given at the close of the meeting.

In the discussion of the paper, W. E. Simons, Wilson Welder & Metal Company, discussed electric welding and gave some figures to show the saving that could be obtained in metal and labor by using welded joints in sheet metal work instead of mutilating the plates by punching holes in them and then riveting the joints. A large field for sheet metal welding is in the construction of steel car bodies.

## Coal Zoning Plan Embarrasses Railway

The Kansas City Railways is among the large coal users in its district seriously embarrassed by the zoning of coal distribution. The company had contracts with Illinois companies, service under which was embargoed on March 30. The company had about 25,000 tons of coal on hand, three weeks' supply. It is now receiving from Kansas mines just about enough to meet its daily demands. Any interference with this movement even this summer will cause a drain on the reserve. The Kansas coal is costing nearly \$1 a ton more than the is able only to get screenings so far. coal cost under the Illinois contract, and the company

# Commissions Without Power in New York

Rochester Decision of Court of Appeals Holds That Regulatory Law Is Defective as Regards Grant of Control Over Franchise Rates—Also Raises Doubt About Power of Legislature to Remedy Situation Owing to Constitutional Clause

THE decision of the New York Court of Appeals in *Quincy v. the City of Rochester*, a preliminary mention of which was made in the *ELECTRIC RAILWAY JOURNAL* of April 13, has now been released for publication. In this decision the highest court in the State rules that the public service commission law makes no provision for the regulation of rates fixed in franchises. Furthermore, although it expresses the impropriety of now deciding the point, the court intimates that in view of the constitutional requirement in New York for municipal consent to utility operation, franchise rates are unalterable except with municipal permission. The court thus raises the doubt whether the Legislature has power to grant relief from franchise restrictions.

## STATUTORY RATES CAN BE CHANGED

After explaining the local details of the Rochester case the Court of Appeals takes up the question of whether the jurisdiction of the Public Service Commission is limited by the Rochester charter amendment of 1915 fixing a 5-cent fare.

On this point the court says:

"The policy of the State is said to be that the Public Service Commission should deal with the regulation of rates of fare charged by railroad corporations without limitation or restraint, and with the power to increase as well as decrease such rates. (*People ex rel. N. Y. & N. S. Traction Co. v. Public Service Commission*, 175 App. Div. 869; *People ex rel. Ulster & D. R. R. v. Public Service Commission*, 171 App. Div. 607,611; *affd.*, 218 N. Y. 643.)

"The section [Section 49, subdivision 1, of the public service commission law], read as a whole, is susceptible of no other natural interpretation than that the Legislature has, for greater certainty, expressly included in its general delegation of powers, the power of the commission to reduce a maximum rate *fixed by the Legislature*. The purpose of the Legislature was to provide for the regulation of statutory fares by a board which may be expected to pass equitably upon conflicting claims with its single purpose the common good, even where a maximum rate had been fixed by the Legislature.

"The case of *Willis v. City of Rochester* (219 N. Y. 427) merely upheld the charter amendment as a constitutional exercise of the legislative power to fix rates. Rates so fixed by special statute are still subject to regulation by the Public Service Commission. The jurisdiction of that body over such rates is not to be reduced by implication. The Legislature merely fixed the rate *pro tempore*."

In regard to the consent required by the Constitution the court states in part:

"The power of the local authorities to impose as a condition to giving consent to the construction and operation of a street railroad that a stipulated rate of

fare should be charged has been repeatedly upheld. (*People ex rel. West Side St. Ry. Co. v. Barnard*, 110 N. Y. 548; *Kittinger v. Buffalo Traction Co.*, 160 N. Y. 377, 391, 392; *Public Service Commission v. Westchester St. R. R.*, 206 N. Y. 209; *People ex rel. Frontier Elec. Ry. v. City of North Tonawanda*, 70 Misc. Rep. 91; *Allegheny City v. Millville, A. & S. J. Ry.*, 159 Pa. St. 411.) But these cases dealt with the question of local power over the corporation and not with the question of general legislative power over the municipality. The question presented is this: The consent of the local authorities being obtained, what jurisdiction has the Legislature conferred upon the Public Service Commission to regulate rates by increasing the rate agreed upon without such consent?

"It has been held that the Legislature may, by virtue of its general power over municipalities, regulate the mode and manner in which the consent of the local authorities to the construction and operation of street railroads shall be given, and may regulate and limit by statute the conditions upon which it may be given. (*Matter of Thirty-fourth St. R. R.*, 102 N. Y. 343; *Beckman v. Third Ave. R. R.*, 153 N. Y. 144, 152; *People ex rel. S. S. Traction Co. v. Wilcox*, 196 N. Y. 212.) Regulations are so made in certain cases by the railroad law, Section 173, but that section expressly provides that nothing therein contained shall be construed as modifying or affecting the terms of the contract between the City of Rochester and the street railroad, and it looks to the future and does not attempt to regulate consents already granted.

## THE CONSTITUTIONAL POINT INVOLVED

"The Constitution does not expressly provide that the municipality may irrevocably establish rates for the entire period of a franchise, and it has been held invariably and in a legion of cases that such power to establish rates is not essential to the consent of local authorities and will not be implied and that the Legislature is at all times supreme in the matter. (*Home Telephone & Tel. Co. v. City of Los Angeles*, 211 U. S. 265; *Arlington Board of Survey v. Bay State St. Ry.*, 224 Mass. 463; *State ex rel. Webster v. Superior Court*, 67 Wash. 37; *L. R. A.* 1915, C. 287; *State ex rel. M. S. R. R. v. P. S. C.*, 168 S. W. Rep. 1156; *City of Manitowoc v. M. & N. Traction Co.*, 145 Wis. 13; *City of Dawson v. Dawson Tel. Co.*, 137 Ga. 62; *City of Woodburn v. Public Service Commission*, 82 Ore. 114; *L. R. A.* 1917, C 98; *Collingswood Sewerage Co. v. Borough of Collingswood*, 91 N. J. L.).

"In all such cases, the question was one of unrestricted legislative power, policy and discretion over a city or town where the local authorities were held to be mere instrumentalities through which the State exercised its sovereign power. The paramount power of the Legislature over the subject of fares was upheld in the absence of a constitutional limitation.



"But our Constitution, by requiring the consent of the local authorities, recognizes that our municipalities are *pro tanto* independent of legislative control, exercising some fragment of power, otherwise legislative in character, which has been thus irrevocably transferred by the fundamental law from the Legislature to the locality. The grant by the municipality of authority to use the streets is not a mere privilege or gratuity. Once accepted, it becomes a contract which neither the State nor its agencies can impair. (People v. O'Brien, 111 N. Y. 1.)

"It is urged by the appellant . . . that the Public Service Commission has no jurisdiction over the subject-matter of rate regulations in the city of Rochester because the Legislature has no power to alter the rates fixed by consent of the company and the local authorities. It is, however, unnecessary and, therefore, improper to decide at this time what the limits of legislative power are in this connection. The delegation of legislative power to commissions and other administrative officers and boards need not be assumed if the general words from which such delegation may be inferred are not reasonably so construed."

#### COMMISSION LAW IS DEFECTIVE

The court then states that the public service commission law and the railroad law deal with maximum rates of fare established by statute but make no reference in terms to rates established by agreement with local authorities. In the court's opinion, it is impossible to find a word in the statutes which discloses the legislative intent to deal with the matter of rates fixed by agreement with local authorities. The authority of the commission to regulate rates in such cases and thus to extinguish an undoubted power of the local authorities should fairly appear before it is assumed to exist. It follows that the Public Service Commission is without jurisdiction and that an absolute writ of prohibition should be awarded against it.

The court divided five to two on the question of the regulatory law being defective, but one concurring judge gave the opinion that the reserve police power of the Legislature had not been contracted away.

## Financial Relief Is Blocked

**Court Decision Destroys Most Fare Increases in New York—Cuts Off General Relief on Most Pending Applications**

SINCE the foregoing decision of the Court of Appeals in the Rochester case was handed down on April 5, the death rate among electric railway fare increases in New York State has been terribly high. Up to the time of the decision the Public Service Commission for the Second District of New York had received thirty-one applications and had granted ten increases. Six other cases were reaching their final stages. Most of the cases, however, have not been able to stand the shock of the decision.

#### SEVEN OUT OF TEN INCREASES ANNULLED

The first announcement of the commission after the decision was to the effect that the 6-cent fares authorized for the Hornell Traction Company, the Ithaca Traction Corporation and the Orange County Traction Company

were apparently not affected. The Waverly, Sayre & Athens Traction Company, however, had voluntarily withdrawn its 6-cent schedule.

To four other companies that had since about Dec. 1, 1917, received permission to charge higher fares, the commission issued orders to show why the increases should not be annulled. Three companies, the Glen Cove Railroad (6 cents), the Northport Traction Company (6 cents) and the Huntington Railroad (6 cents), did not appear on the return of the orders but restored their 5-cent fares. New tariffs were filed on April 18.

The fourth company, the Hudson River & Eastern Traction Company, objected at the hearing to the revoking of the order permitting it to charge a 7-cent fare. Counsel for the company argued that its franchise did not come within the prohibition of jurisdiction set by the Court of Appeals. Decision was reserved by the commission, and a few days later the company filed a tariff announcing a reduction to the old 5-cent rate.

Two other fares of 7 cents had been granted, in the cases of the Peekskill Lighting & Railroad Company and the Putnam & Westchester Traction Company. These cases had been reopened last February, partly on the ground of a franchise fare restriction, and after the Court of Appeals finding the commission reserved decision. The Peekskill company, however, has filed a 5-cent tariff.

#### MOST OF PENDING APPLICATIONS INVOLVE FRANCHISES

The commission also sent out notices for a public hearing on April 18 on the pending petitions of twenty-one electric railways. The companies included the following:

- Albany Southern Railroad.
- Auburn & Syracuse Electric Railroad.
- Corning & Painted Post Street Railway.
- Elmira, Corning & Waverly Railway.
- Elmira Water, Light & Railroad Company.
- Empire State Railroad Corporation.
- Fishkill Electric Railway.
- Geneva, Seneca Falls & Auburn Railroad.
- Hudson Valley Railway.
- Kings Consolidated Railroad.
- New York & Stamford Railway.
- New York State Railways.
- Schenectady Railway.
- United Traction Company.
- Westchester Street Railroad.
- Syracuse & Northern Electric Railway.
- Empire United Railways, Inc.
- Rochester, Syracuse & Eastern Railroad.
- Buffalo, Lockport & Rochester Railway.
- Poughkeepsie & Wappingers Falls Railway.
- Buffalo & Lake Erie Traction Company.

At the hearing Charles E. Hotchkiss, New York, N. Y., representing the carriers, stated that all legal remedies had not yet been exhausted, and that there was under consideration an application for a reopening of the decision in the Rochester case. He suggested that the commission in the meantime reserve decision as to the dismissal of the various applications.

The petitions were then taken up one by one, to ascertain the franchise questions involved. The Buffalo & Lake Erie Traction Company said that there are some fare restrictions and asked that the case be set down for April 29. The Albany Southern Railroad's application was set down for April 25. The corporation counsel of Rensselaer said he desired to introduce the village franchise.

The Corning & Painted Post Street Railway stated that there are fare limitations in Corning and Painted Post. On the Elmira, Corning & Waverly Railroad there is one franchise limitation, and it was asked that the case be held for hearing on notice. The Elmira Water, Light & Railroad Company said that there are no franchise restrictions.

The Empire State Railroad Corporation testified to seemingly no rate restrictions in Oswego, Fulton, Syracuse and Auburn. The Fishkill Electric Railroad has no restriction as to fare. There was no appearance for the Geneva, Seneca Falls & Auburn Railroad.

The Hudson Valley Railway asked that the case be continued with privilege to file an amended petition. It was said there are two instances of fare restrictions, in Saratoga Springs and Glens Falls. City representatives claimed the existence of a fare restriction in Fort Edward.

The New York & Stamford Railway stated that there are some fare restrictions and some modifications of the franchise agreements. Port Chester representatives stated that there is no question but that the Court of Appeals decision applies to that village. This case had been started before the commission, and after several franchises had been introduced by villages interested, the commission declared the case closed. City counsel asked for a reopening of the Poughkeepsie & Wappingers Falls Railway's application in order to submit a franchise limiting the fare. The request was granted by the commission. This case had been closed but not decided.

The Schenectady Railway said that there are some franchises with limitations and asked leave to withdraw its application. The corporation counsel of Albany asked to have the application of the United Traction Company continued with leave to amend the petition. The Court of Appeals decision, he said, does not dispose of the case. The corporation counsel of Troy averred that there are a number of franchise restrictions on the company's lines in Troy.

The Westchester Street Railroad testified to a multiplicity of franchises and some restrictions, and asked that the case be reserved. The Syracuse & Northern Electric Railway said that it operates in Syracuse under a traffic agreement. This also applies to the Rochester, Syracuse & Eastern Railroad and in Rochester to the Buffalo, Lockport & Rochester Railway. Some restrictions exist in the case of the Auburn & Syracuse Electric Railroad.

The Kingston Consolidated Railroad Company is probably affected on one division, and there was a request to hold the case open. The New York State Railways stated that Syracuse is not involved in the court decision. There are some franchise restrictions in Oneida and on one or two lines in Utica. Little Falls seems to have a franchise restriction, but there is none in Rome.

The hearing, therefore, served to establish the fact that most of the pending applications, in whole or in part, involve franchise rates. Only three companies asserted that no franchise limitations upon fares exist. In the case of the United Traction Company, there seem to be no franchise limitations for its Albany lines, just as there are none for the Syracuse lines of the New York State Railways.

## Conference on War Topics

**Southwestern Association Has Two-Day Conference Instead of Usual Convention—Thorough Study to be Made of Possibilities of Using Texas Lignite as Fuel**

THE fourteenth annual convention of the Southwestern Electrical & Gas Association was held in Galveston on April 15 and 16, but, on account of war conditions, the executive committee arranged for a "conference" rather than a convention. All public entertainment was cut out, the convention was limited to two days, and few formal papers were read. The program of the convention in all three of its sections, namely, gas, railway and electric light and power, was arranged to include a discussion of the topics made most important by war conditions. These topics were, as a whole, fuel, labor-saving machinery and apparatus, the general labor question, legislation and methods of increasing net earnings either by increased rates or decreased costs of operating.

While the attendance was not—and was not expected to be—as large as at previous conventions, more than 150 members were in attendance.

The association decided that it would hold local meetings of the chairmen of the three sections three times per year, in different portions of the State, and invite the attendance of all adjacent members. This arrangement will virtually have the effect of three sub-conventions held during the year, located geographically so that the distance to be traveled by each member will be quite small. These meetings will occupy only one day each.

The only other actions taken were the decision to appoint a committee—the names not yet determined—to investigate and report on the use of Texas lignite both as a fuel and for gas making, the researches to be made in conjunction with the University of Texas, and the appointment of another committee to investigate the establishment by the association of two or more post-graduate scholarships on chemistry and electricity at the University of Texas so that the problems of fuel, lubrication and water purification may be under continual research at the University and their results accessible at any time to any of the members of the association. In his annual address President Morris said, in part:

### PRESIDENT'S ADDRESS

"We of the utility business are behind other manufacturing and distributing plants in the use of labor-saving machinery. With the sole exception of firing our boilers we have been plodding along with the same proportion of labor to our output as we have for years past. It is true that we have greatly increased the size of our generating, transmitting and distributing units, and have thus indirectly decreased the proportion of labor to output that has been in most cases a resultant not fully considered in the investment because the reason has been to obtain greater efficiency and economy in our apparatus. If by the expenditure of \$500 we make a net saving of only 10 cents per day in labor we have made an annual saving of \$36.50, a sum which is more than 7½ per cent on the investment. To make this saving is almost as good as to buy a Liberty Bond and nearly as patriotic,

for we have released nearly \$40 worth of actually useless labor, and as the government is in serious need of labor at this time every cent's worth wasted is a crime.

"The question of fuel in Texas is a complicated matter, because we have four fuels locally available—coal, lignite, natural gas and oil. The distances in the State are so great that freight and pipe line costs are a large factor. The necessities of the national government are such at this time that not only the mine prices have been raised on coal, but freight rates in some cases have been advanced. It seems probable that the use of oil as fuel may be still further restricted in the future to an extent which will make it too costly or too uncertain for the use of public utilities.

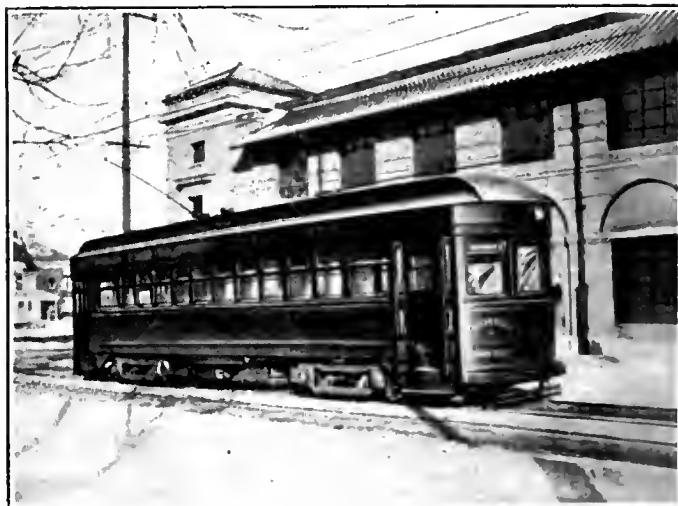
"There has come at least one bright spot in the gloom surrounding the public utilities at this time and that is the recognition which they have received at the hands of the government. No one can read the letters of our President and our Secretary of the

## New Four-Motor Multiple-Unit Cars at Dayton

**Oakwood Street Railway Builds New Cars for Train Operation Equipped with Safety Devices of Home Design**

THE Oakwood Street Railway, Dayton, Ohio, has recently built in its shops five double-truck, multiple-unit passenger cars which in many respects are quite similar to other double-truck equipment built by this company. The new cars are 44 ft. 9 in. long overall, 8 ft. 3 in. wide and seat forty-four passengers. They are of wood construction with steel underframe and steel sheathing, and have the appearance of very heavy cars for city service. They actually weigh a little less than 19 tons each complete. Experience with somewhat similar equipment convinced the company that the long life of a conservative car would more than offset the economies afforded by an extremely lightweight car.

Four-motor equipments were chosen on account of a



EXTERIOR AND INTERIOR VIEWS OF NEW MULTIPLE-UNIT CAR FOR OAKWOOD STREET RAILWAY

Treasury or the reports of the Comptroller of the Currency and not feel that our efforts have not been fully appreciated."

### OFFICERS ELECTED

The officers for the ensuing year elected were president, W. A. Sullivan, general manager Shreveport Railways; first vice-president, Burr Martin, general manager Texas Electric Railway; second vice-president, E. S. Fletcher, assistant general manager Texas Power & Light Company; third vice-president, A. Hardgrave, vice-president Marshall Electric Company; secretary, H. S. Cooper; treasurer, J. B. Walker.

The executive committee is made up of the president, vice-presidents and H. C. Morris, R. Meriwether and W. B. Head, Dallas; J. C. Kennedy, Brenham; S. R. Bertron, Jr., and F. D. Murphy, Houston; F. J. Storm, Amarillo; W. B. Tuttle, San Antonio, and G. H. Clifford, Fort Worth. The usual advisory committee was also elected.

V. W. Berry, Northern Texas Traction Company, Fort Worth, was appointed chairman of the railway section for the ensuing year.

stretch of track which contains a number of curves and heavy grades. On more than a mile of this the average grade is a little over 6 per cent and the maximum  $8\frac{1}{2}$  per cent. The motors are Westinghouse 323-V with HL unit-switch, multiple-unit control. The cars are now being operated singly, as they are not yet equipped with electrical couplers. General Electric straight air brakes, with the automatic feature, are used, with compressors of the CP-27 type.

The cars are equipped with standard C-50-P trucks having a 6-ft. 1-in. wheelbase and 30-in. rolled-steel one-wear wheels arranged for inside-hung motors. The distance between truck centers is 22 ft. the trucks being placed as far apart as possible to give the car an easy riding quality. The 20-in. wheels give a 12-in. height for the first step, and 11-in. steps to the platform and from the platform to the car floor. The floor is ramped  $2\frac{1}{2}$  in. in 5 ft. at each end of the car.

The door-operating mechanism and door-signal system is of the company's own design and make. Hand operation is used, the front or entrance doors being controlled by the motorman and the rear doors by the conductor. It is so provided that the doors on both

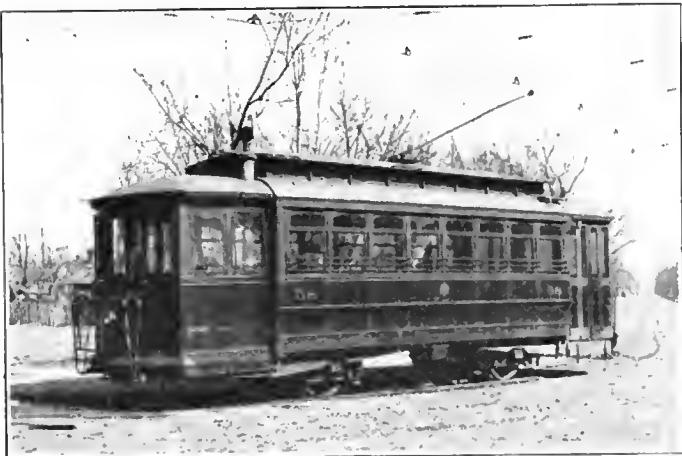
sides of the car can be controlled from the conductor's position, in order that on the second car of a two-unit train the front doors can be used for both entrance and exit. In the design of the door-operating mechanism, the main object was to eliminate all unnecessary apparatus and to provide all possible space over the life guard by placing as few parts as possible under the platform. With the equipment used only one of the double doors is operated from beneath the car. This door transmits motion to the step through a set of small bevel gears and operates the second door with sprocket and chain across the top. The doors are not interlocked with the control circuit, but with the cars operated either singly or in trains a signal lamp mounted in front of the motorman gives him a clear indication when all the doors are closed and a red light when either door is open.

The illuminated destination signs and the fare boxes used are also of the company's own manufacture. The fares are dumped into a hopper by means of a foot treadle and no register is used. This leaves the conductor's hands free to issue transfers, tickets and change and gives him additional time to inspect fares. There is an advantage in this as the tickets of five additional companies are honored.

The seats were furnished by Hale & Kilburn, ten crosswalk-over seats on each side and two box longitudinal seats in opposite corners, the spaces opposite the cross seats being open to allow easy entrance and egress of passengers. The electric heaters, controlled by thermostats, and the passengers' buzzers are furnished by the Consolidated Car Heating Company. The lighting system consists of three hemispheres in a deck, each containing two 23-watt Mazda lamps, and six lamps of the same size on each side mounted on wall brackets and provided with shades.

### Radial Trucks for Power Saving and Better Riding

THE practicability of the radial truck, particularly for medium-length cars, has been demonstrated now in quite a number of installations. A recent example is that of the Hutchinson (Kan.) Inter-Urban Railway which in 1917 equipped the car shown with a radial truck from the Philadelphia Holding Company. The car exclusive of trucks weighs 10 tons and is 33 ft. long over all and 21 ft. over the corner posts. It was found that a car of this weight and dimensions could



INTERURBAN CAR EQUIPPED WITH RADIAL TRUCKS

not be handled properly by the original trucks of 7-ft. 10-in. wheelbase. So much oscillation developed in fast running that the front wheels would leave the rail entirely and take out across country.

James E. Humbert, general manager of this railway, reports that since installing the radial truck the car rides like a double-truck car over the roughest sort of special work; runs at maximum speed on interurban track without trouble; uses less energy, takes the shortest curves and binds so little that it will start on the first point from a dead stop in the middle of a 45-ft. radius curve.

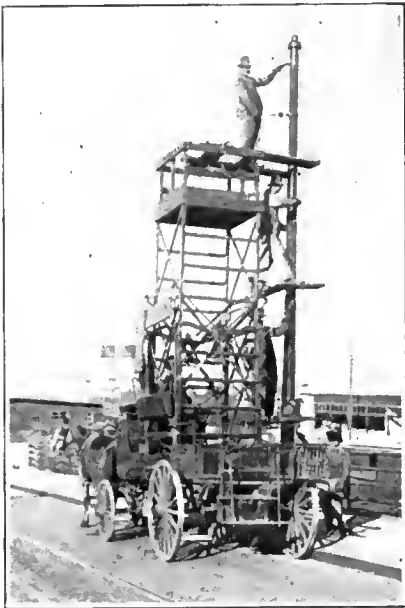
### Pole Painters' Tower Wagon With Three Platforms

Cheaper Labor Can Be Used on a Safe Structure—Through Use of This Wagon Much Time Is Saved and Accidents Are Prevented

BY S. L. FOSTER

Chief Electrician United Railroads of San Francisco

IN ORDER to paint iron poles expeditiously the United Railroads of San Francisco equipped one of the ordinary Trenton two-section tower wagons for this work. The swinging leaf was removed and the top of the tower was provided with a floor and railing on which were mounted two sliding boards for the topmost man. These boards can be pulled out on either side of the wagon to permit reaching all sides of the pole. The second man from the top is provided with a single adjustable hinged platform with movable projecting arm on which he can stand in getting at his part of the pole. This platform is supported by hinged iron struts without bolts or nuts. The third man from the top has a similar hinged platform but it is suspended by chains. The fourth man, the foreman of the crew, paints his part of the pole standing on the ground and attaches the conspicuous "Paint" sign on the finished pole in addition to his usual duties of supervision.



POLE PAINTERS AT WORK WITH TOWER WAGON, UNITED RAILROADS OF SAN FRANCISCO

After each man has brushed, scraped, sandpapered or chipped his part of the pole as conditions require and has painted it, the top man steps back onto the top of the tower and withdraws his two boards from around the pole. The second man steps down onto the front of the wagon back of the driver's seat and assists the third man to drop the second platform and lift up the third platform until it lies against the tower. Here it is fastened securely by a hook in a link of the chain



suspension. There are platforms on either side of the tower for the two intermediate painters.

With this method of painting there is no climbing up and down ladders as succeeding poles are painted. There is a minimum of danger of men falling and ladders slipping or being struck by outsiders or vehicles as the men have stable platforms to stand on. A cheaper class of workmen can also be employed on such a safe structure.

The time occupied in painting one 30-ft., 5-in., 6-in., 7-in. tubular pole is usually not more than six minutes on second coating work.

Before this tower passes along the pole line all of the poles have their bases scraped and painted with red lead for a foot or more. This red-leading of the pole bases is done by one man on foot who precedes the tower crew by a week or more.

When workmen are painting poles, all metal parts in their reach are covered, including crossarms, iron pins, pole bands, iron links and the make-ups of the stranded span or guy wires.

All ornamental cast-iron rings at joint insertions and all cast-iron base castings were broken off the iron poles in San Francisco years ago and the use of such accessories was dispensed with except on two main streets where elaborate cast-iron ornamentations were recently installed for franchise reasons. The ornamental rings previously used were found to harbor moisture and to lead to rapid corrosion of the pole, while their inside surfaces were inaccessible to the painters.

## The Interurban Freight Terminal

The Author Cites Reasons for Congestion at Terminals and Makes Suggestions for Improvement of Electric Freight Handling Methods

BY THOMAS B. MCMATH

Chief Engineer Indianapolis Traction & Terminal Company, Indianapolis, Ind.

**I**NTERURBAN freight handling differs from steam railroad freight handling in several ways. Steam roads have a great number of cars available, and they permit the freight to remain for a considerable time in the car, which need not be set at the freight house until it is convenient to unload it. There are always several cars available at the platform for loading material bound for as many destinations. Congestion in the freight house can largely be avoided by a systematic and careful agent.

Interurban freight cars, on the other hand, are not numerous, and the trains seldom consist of more than a motor and a trailer. The fact that the motor car, and generally the trailer also, must be loaded and unloaded on schedule imposes the most impressive difference from steam railroad practice.

An ordinary freight car makes about 25 miles per day, due to the time spent in yards and the great time allowance for loading and unloading, while interurban freight car mileage must be about 120 per day.

If freight is offered at the interurban freight house throughout the day, it must be placed on the floor until the train arrives and is unloaded. All freight offered after the train leaves must be held for the next train. This requires a greater amount of floor space than in

steam railroad practice. The house floor space should be approximately four times the car floor area. The floor area, therefore, in an outbound freight house open all day to receive freight should be not less than double the car floor area of all the cars to be loaded during a day at that house. This is assuming that but one freight shipment per day is available to any destination, and that this train remains only two hours to unload and be reloaded.

Inbound freight presents a worse condition in that it remains on the floor twice as long as the outbound freight and requires twice the floor space of the latter. The problem of handling inbound freight depends largely upon the rapidity with which the consignee calls for his shipment, and this is largely beyond the power of the agent to control or regulate. The investment in freight terminals for interurban roads is so great in proportion to the tonnage handled that it seems to be a mistake to follow the customary methods of handling. It is considered prompt if freight is removed from a steam railroad terminal in forty-eight hours, but in most cases the road has consumed the time of at least three or more days in transporting it. Comparing this with forty-eight hours to remove freight from a car that was loaded, taken to the destination and unloaded in six or eight hours, as on an electric railway, it will clearly be seen that forty-eight hours' free time given in an interurban freight house to unload a car is desperately slow. In proportion, only five and one-third hours' free time should be allowed. The customary time allowance is not giving the interurbans fair treatment and is depriving many customers of service that would be available if the hauling could be speeded up.

It seems that the English freight system has features to commend it and should be adopted. This consists of making the freight delivery direct to the consignee by having a transfer company take the inbound freight direct from the car or freight house to the place of business of the consignee—in other words, the service which is done in the United States by express companies. This transfer company could also call for outbound freight, and thus by giving attention to train schedules, could save time and floor space loading. This change in the system for handling freight has been considered by the War Council at Washington, and it is to be hoped that some favorable conclusion can be reached.

The present congestion in freight of the steam roads has thrown freight to the interurbans that is overtaxing their facilities to such an extent that efficiency in handling is out of the question. Large increases in facilities are financially impossible, but the remedy just suggested would permit an increase of 30 per cent in efficiency, without requiring any expenditure of capital and should be applied. The hardship to the customer in depriving him of the privilege to haul his own freight at his convenience would be more sentimental than actual. The benefit to the community in the increase in freight capacity and the shortening of the time of freight in transit would surely compensate for this loss in the privilege of delay in unloading.

It is also probable that such a system of freight delivery would decrease freight claims very materially, as shortage and breakage would be known immediately,



## Will Regulation Meet New Needs?

### Commission Counsel Raises Question Whether Municipalities Are to Pass on to Extension of Control Over Utilities

IN AN ADDRESS recently delivered before the Boston Chamber of Commerce, William L. Ransom, counsel Public Service Commission for the First District of New York, discussed various aspects of the relation between municipalities, electric railways and the public. Besides relating some of the experiences in New York City in connection with rapid transit construction and operation, he raised some important questions in regard to the future of public utility regulation.

According to Mr. Ransom, the electric railway industry has to meet increasing costs of operation, and the question is squarely raised whether the system of commission regulation and municipal franchise requirements, based upon the idea of curtailing rates and augmenting service, can be made now to operate flexibly in

*(Concluded from page 816)*

and while it is still possible to place the responsibility and apply preventive remedies. Stealing might also be materially lessened if shortages were promptly noted.

If the business address of the consignee was put upon all bills of lading, and the acceptance of freight was made dependent on such address, the trouble in sending out notices as under the present conditions would be greatly decreased. Notices could be mailed immediately upon receipt of the shipment, and, if desirable, notices of bulky receipts could be made by telephone to help relieve congestion. As a concrete suggestion for improvement, why not require the receiving agent to make out a postal card notice simultaneously with the original way-bill? These cards could follow the shipment in the hands of the conductor, and the receiving agent would simply have to apply postage and mail the cards immediately on arrival of the car.

An increase in the number of trailers would not be prohibitive. This might permit a more frequent service to major towns in carload lots, instead of loading all on a local freight train. These steel cars could be loaded at the convenience of the agent, and similarly unloaded at their destination. They could be hauled behind passenger trains and set out at their destination with a minimum delay to passenger service.

#### KEEP DRIVEWAYS CLEAR

The driveways provided for vehicles are generally entirely inadequate and materially slow down the rate of freight movement when congested. The agent, of course, is not apt to consider the raising of such blockade as a part of his duty, especially since it affords some relaxation for an overtaxed set of men in the freight house. Interurban freight house design should provide driveways wider than for a steam road house of the same dimensions and should always include a separate exit.

A comprehensive study of the freight problem by those interested should indicate other possible economies and means to greater efficiency, which could be used to the ultimate benefit of both customer and carrier.

the opposite direction. Will the public wish intra-urban fares to be raised, or will they seek an extension of municipal development in preference thereto? In Mr. Ransom's opinion, the country has a regulatory mechanism adapted to the disposition of complaints when made, rather than to constructive, affirmative, anticipatory handling of public utility problems.

As far as the legal barriers are concerned which stand in the way of the flexible working of regulation, Mr. Ransom conceived that they can be overcome, perhaps tardily but eventually, if the period of rising costs is prolonged and patriotic needs are found to require some abridgment of service. He believed, however, that the acceptable solution of this question of power is far from assurance that a plan of public control devised to protect the public from rates too high will prove a practicable means of protecting the public from rates so low as to destroy the capacity of the companies to serve the public in an adequate way.

#### PUBLIC CANNOT CONTINUE INDEFINITELY TO GET SOMETHING FOR NOTHING

The question whether a 5-cent fare should be continued on urban transportation lines is not, in the last analysis, one of public or private ownership. Mr. Ransom averred that no change in either ownership or operation can alter an economic formula of relationship between fares and expenses. The public cannot permanently get something for nothing or a public service long for less than cost, under any plan of ownership, operation or control that has been or can be devised. The cost of furnishing service must be borne either wholly by the fare-paying passenger or partly by the fare payer and partly by the taxpayer.

In regard to the surface lines in New York City, Mr. Ransom stated that these will never fulfill their function except as they are co-ordinated with the rapid transit lines on some basis protecting the public from the taking over of deteriorated and unnecessary properties at excessive cost, and then are radically readjusted and reorganized to meet their place in a modern transit plan.

Not later than the close of the war, in his opinion, will come the starting of plans for additional transit lines, into which the surface lines will be closely linked, and also an agitation for new contracts, in which the principal of municipal development and municipal responsibility will be much further extended. Moreover, the transportation utilities will be more closely correlated with the supply of such services as light, power and heat, for the better distribution of non-peak uses, greater economy in central station use of fuel and greater stability of supply to essential industries.

In closing, Mr. Ransom remarked that "the defiant manager of medieval cast of mind and the meticulous lawyer with his ignorance of the past ten years of judicial decisions are giving way to the remedial expert—the broad-minded specialist in public point of view—who faces facts unflinchingly, seeks points of agreement rather than divergence, realizes that controversies carry no passengers and would prefer a plan of operation to a law suit." This is as it should be stated Mr. Ransom, for the public utilities of to-day call for the highest qualities of constructive statesmanship.

## Massachusetts Suburban Lines Losing

**Commission Chairman Says that the Experiment  
of Extending City Service into Country  
Districts Has Been Disastrous**

**T**HERE is little doubt that the suburban and interurban service in Massachusetts has for a long time been furnished for less than its legitimate cost, in the opinion of F. J. Macleod, chairman Massachusetts' Public Service Commission. Mr. Macleod expressed such a belief in an address on April 8 before the Economic Club of Brockton.

According to the speaker, electric railways in Massachusetts have undertaken the disastrous experiment of trying to extend to the country districts the ordinary type of city service. About the only company of the purely interurban type is the high-speed line formerly known as the Dartmouth & Westport, which is now consolidated with the Union Street Railway and operated on a private right-of-way between Fall River and New Bedford. That line has proved exceedingly profitable, and it may be that similar lines could be successfully operated between adjacent cities in other parts of the Commonwealth.

But the type of interurban transportation which is commonly furnished in Massachusetts, Mr. Macleod averred, has proved a serious drain upon the financial resources of the companies in the past, and it is extremely doubtful that it can be made profitable under any scale of rates. It may be possible to increase substantially the present revenues from these lines by placing their rates on a mileage basis, but so long as they operate an irregular and undependable service over public ways at a speed of 10 or 12 m.p.h. they cannot expect to charge railroad rates and compete successfully with present interurban railroad service.

Undoubtedly a serious error of judgment was made by those who conceived and carried out the various schemes of consolidation resulting in the present hybrid and diversified electric railway systems in Massachusetts. Their delusion, however, was a common one during the era immediately following electrification. Moreover, the policy pursued by the companies received not only the approval but the active encouragement of the Legislature and other public authorities.

Up to the present time, Mr. Macleod said, the lines operated outside of the thickly settled urban districts have been run at a substantial loss, and their continued operation has been possible only because their operating deficits have been met out of funds needed for maintenance and depreciation charges on city lines. The deficiency has been made up at the expense of the properties and of the investors. Such being the situation, the practical question arises as to what is going to be done about it.

The first problem is to determine whether all existing electric railway facilities are to be preserved. There is no doubt that a considerable portion of the present railway mileage in Massachusetts cannot be made self-supporting by any possible increase of rates. The fact that a line ought never to have been built, however, does not necessarily mean that it can now be abandoned to advantage. If a line earns enough to pay

the additional operating cost and a return upon the salvage value of the property, there is no financial gain in abandoning it, even if it must remain to some extent a drag upon the remainder of the system.

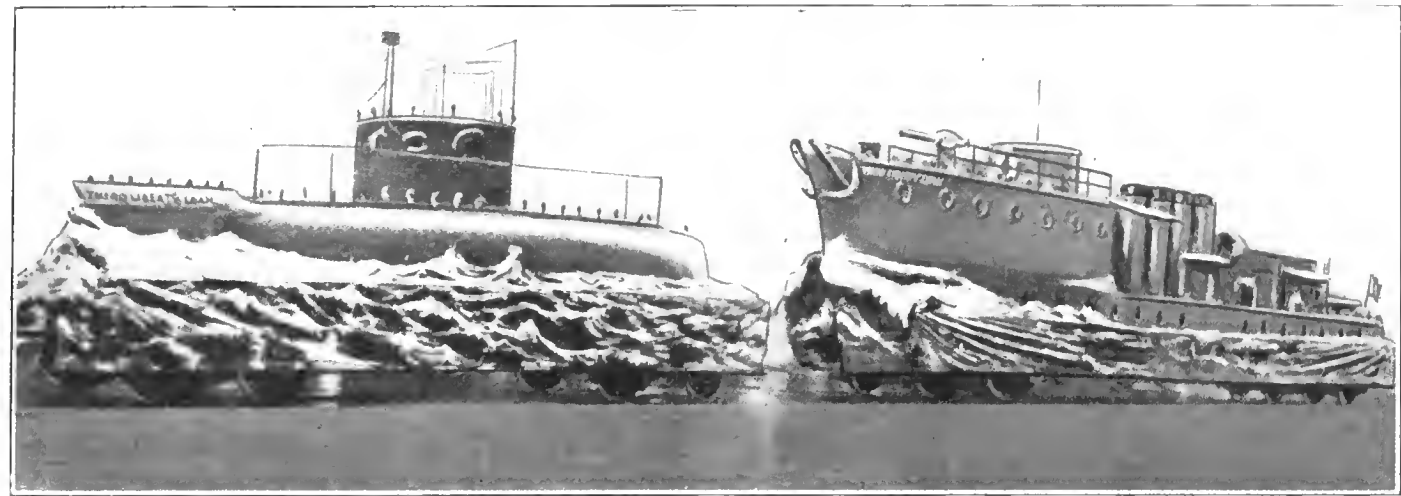
Where lines do not now earn and cannot be made to earn even that amount of revenue—and there are a large number of lines of that character—Mr. Macleod believed that the company can neither be forced nor reasonably be expected to carry such lines any longer at its own expense. If they are to be retained, the loss in operation must be met either by a direct contribution from the communities served or by a higher rate of fare upon the more prosperous lines. That is not a problem as between the company and the public, but one involving the difficult task of determining a proper distribution of the benefits and the burdens of transportation as between different communities served by the same system. In any event, the proper cost of the service which is retained must in some way be borne by the public.

### NO DEFINITE STANDARD FOR MANAGEMENT

In the practical application of this principle, Mr. Macleod said, it is necessary to determine to what extent the actual expenditures of the company represent the legitimate cost of operation. In making this determination it is necessary to eliminate all return upon watered stock or other speculative securities, the interest upon indebtedness representing wasteful or improper expenditures, and losses due to mismanagement or inefficiency of operation, all of which should rightly be charged against the stockholders. This is the most difficult problem in regulation because of the absence of any definite standard which could be used as a basis for determining mismanagement or inefficiency. Continuing, Mr. Macleod said:

"Electric railway managers, like all the rest of us in our own business affairs, may have made honest and carefully considered decisions which for the moment seemed to be wise, but which in the light of experience have proved to be mistaken. It is easy to be wise after the event, but it is given to no man to read the stars and guess the riddle of the future. The fact, therefore, that an electric railway has made mistakes is not in itself a proof of mismanagement. It must have sinned against the light and gone ahead with the danger signal brightly burning. Just where the line is to be drawn between justifiable error and mismanagement must remain in many cases a question of individual judgment and discretion, upon which honest men may reasonably differ."

No increases in rates, Mr. Macleod said, should be allowed unless the legitimate need of such increases is clearly demonstrated. Any attempt on the part of the companies to force unwarranted and arbitrary increases should be vigorously resisted, both by the commission and the public at large. On the other hand, if an increase of rates is shown to be just and reasonable in order to respond to the increased cost of operation, there is no sound reason why it should provoke any greater resentment than the higher prices the public is obliged to pay at the present time for practically everything else. Electric railway service, judged by any reasonable standard of relative values, is the cheapest thing in the market to-day.



FLOATS MOUNTED ON TRUCKS OF UNITED RAILWAYS, ST. LOUIS, AND USED IN THIRD LIBERTY LOAN DRIVE

# Boosting the Third Liberty Loan

THE electric railways of the United States are behind the Third Liberty Loan to the last ditch. Many of them are in dire straits financially, but when it comes to backing Uncle Sam in this world conflict, and standing behind the boys in the front-line trenches, the railways are there as a unit.

Examples of patriotic co-operation in the Third Liberty Loan campaign are shown in the accompanying illustrations. One is a cover design of the Kansas City *Railwayman*, the weekly publication of the Kansas City Railways; another shows the advertising carried by the city cars of the same company, while the third is a pair of floats mounted on trucks of the United Railways of St. Louis.

This and the preceding Liberty Loan campaign have demonstrated the value of electric railway company publications of one kind and another in spreading information, kindling enthusiasm and inducing definite action. A model use of such an opportunity was the

letter on the loan by General Manager A. D. Mackie, which occupied the first page of last Saturday's *Springfield (Ill.) Utilities News*. It was addressed to employees but its appeal is to a wider circle.

An attractive feature of a recent issue of the *Railwayman* was the following acrostic:

Liberty for all.  
Integrity of home.  
Buy victory—Buy “war savings” and “thrift” stamps.  
Every miser helps the Kaiser.  
Raise your quota to make up for the dollar slacker.  
Two bits a day—the patriot’s way.  
You cannot act as though we were at peace.  
  
Lend your money to Uncle Sam.  
Others give their lives! What will you give?  
America needs your help! Be true to democratic principles.  
No power can stay a German victory but real sacrifice.



PATRIOTIC COVER OF THE "RAILWAYMAN" (K. C. RYS.) AND BANNER MOUNTED ON SIDE SHEATHING OF CITY CARS OF SAME COMPANY

## AMERICAN ASSOCIATION NEWS

### Atlantic City Selected for 1918 Convention

**A**S ANNOUNCED on the editorial pages in this issue the annual convention of the American Association and the affiliated associations will be held at Atlantic City, N. J., during the second week in October. There will be no exhibits. According to the tentative program so far prepared, the American Association meeting will open on Tuesday afternoon, Oct. 8, and close on Wednesday afternoon. The affiliated associations will meet Wednesday and Thursday mornings.

The Engineering Association committee on program, consisting of Martin Schreiber, Newark, N. J., chairman; E. R. Hill, New York City, and C. L. Cadle, Rochester, N. Y., met in New York on April 18 and prepared a tentative program. This was presented on April 19 at a meeting of the Engineering Association executive committee. The executive committee of the Transportation & Traffic Association also met on April 23 for the purpose of planning a program. Neither this nor the engineering program will be announced for some little time as conditions in the field are so variable as to warrant a postponement of the final plans. It was decided that in neither of these associations will any of the regular committee work be taken up for the present.

The T. & T. Association committee meeting was attended by L. C. Bradley, Houston, Tex.; W. H. Collins, Gloversville, N. Y.; R. P. Stevens, Youngstown, Ohio; L. H. Palmer, Baltimore, Md.; J. J. Dempsey, Brooklyn, N. Y.; H. B. Potter, Boston, Mass., and E. B. Burritt, New York City.

Those at the Engineering Association committee meeting were F. R. Phillips, Pittsburgh, Pa.; W. G. Gove, Brooklyn, N. Y.; C. S. Kimball, Washington, D. C.; C. L. Cadle, Rochester, N. Y.; and E. B. Burritt, New York City.

### J. W. Stephenson on "Electropneumatic Interlocking"

**I**N HIS PAPER on "Electropneumatic Interlocking" delivered before the Chicago Elevated Railroads company section meeting last month (see E.R.J., March 30, page 635), J. W. Stephenson, signal engineer of the companies, said some very interesting things regarding interlocking in general and on the Chicago property in particular. For instance, at Lake and Wells Streets tower on the Union Loop, 912 cars pass through in one hour and the number of lever movements in the tower per day averages 7700. An interlocking plant is provided at this point, as it would be too much to expect a man to do this work without such assistance.

Mr. Stephenson explained to the section, with the aid of lantern slides, that an interlocker is a collection of levers in a machine, so interconnected that the movement of functions will occur only in a predetermined way, in order to prevent the setting of conflicting routes. Movements in the machine take place as follows: (1) The signals and trips on all opposing routes are set in the "stop" position. (2) The switches, mov-

able point frogs and the trips in the route to be given are placed in the proper position and locked. (3) The signal for the route given is set at "clear." After a clear signal has been accepted by the motorman it is important that the route should not be changed while the train is passing over. This is prevented by means of a detector bar of steel lying close against the outside of the head of the rail and long enough to reach from truck center to truck center of the wheels. This is connected to the switch and locking device and supported by clips which raise it above the top of the rail. The bar cannot move when a car wheel is standing upon it or rolling over it.

Mr. Stephenson divided the several methods used in interlocking into four types; mechanical, electric, electro-mechanical and electropneumatic. He said that for conditions on the elevated property the electropneumatic interlocking was especially well suited. In any system simplicity and rugged construction of parts is a great factor in maintenance. Mr. Stephenson called attention, however, to the importance of the human element in successful maintenance. In applying the company's motto "Keep traffic moving," 2 per cent of success is due to ingenuity and 98 per cent to hard work. Success depends upon having replacement parts ready, testing for trouble before it happens, systematically inspecting plants, etc. "What we need in these strenuous times is the man who shows signs of wear at the knees rather than at the seat of his pants."

### Capt. E. J. Blair Addresses Section No. 6

**T**HE meeting of the Elevated Railroads (Chicago) section, held on April 20 with an attendance of 125, was of a patriotic character. Capt. E. J. Blair of the 311th Engineers, electrical engineer of the company, described the training at Camp Grant and gave much information regarding conditions on the western battle front in France. Capt. Hart E. Fisher of the Medical Reserve Corps took up the medical side of the work in the army.

The Third Liberty Loan was the other prominent feature of the discussion. A report showed that \$200,000 had already been subscribed by company employees to this loan. Patriotic hymns and other music were interspersed with the talks.

### Manila Section Growing Apace

**A**T THE MEETING of joint company section No. 5, held at Manila on Feb. 12, the membership committee presented the names of fifty-three applicants. Of these forty, or 75 per cent, were from the transportation department. This increase brought the membership to 197.

At this meeting P. Castillo, carhouse starter, spoke on "Some of the Duties of a Carhouse Starter," and M. Fariñas, traffic inspector, spoke on "Trainmen as Witnesses." At the March 5 meeting the speaker was I. G. Obligacion, chief clerk transportation department, whose topic was "The Menace of the Transfer." Abstracts of the papers mentioned, and of the accompanying discussion, will be given in a later issue of the ELECTRIC RAILWAY JOURNAL.



# News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

## Agree on Use of Union Button

**This Matter a Problem for Kansas City Railways After Sympathetic Strike Settlement**

When the employees of the Kansas City (Mo.) Railways who did not join the strike returned to work on March 29, they were advised in the cases of union men not to wear their buttons in conspicuous places. This suggestion was made in order to avoid possible violence from strike sympathizers who might resent more the presence of union men on the cars than they would the presence of non-union men.

Later an agreement was signed in the nature of a statement to employees, covering the whole button subject. At the same time, a statement was made signed by W. D. Mahon, president of the Amalgamated Association, to the effect that future disputes and the making of a new contract in August should be settled by conciliation or arbitration, and that there should be no strikes.

The agreement signed by Col. Philip J. Kealy, president of the Kansas City Railways, and Mr. Mahon in so far as it relates to the use of the button is as follows:

"President Mahon's understanding was that upon their return to work the men would be permitted to wear their organization buttons, whereas the company's position was that it was necessary to discontinue the wearing of buttons in order to avoid taunts, threats of violence and intimidation being made to those men who continued to operate their cars during the past four or five days. In a sincere endeavor to furnish immediate service to the public, the following agreement has been reached:

### PROVISIONS OF THE AGREEMENT

"1. The men will return to work immediately with the liberty of wearing their buttons.

"2. The order of the company prohibiting wearing of buttons is hereby revoked. The intent of the company in issuing said order, that is, that the men who continue their work will be protected from intimidation, taunts and violence, is met by the assurance of Mr. Mahon that there will be no discrimination raised against any employee who does not wear the button. It is also further understood that employees who did work during the present controversy and are members of the organization shall have the right to wear their button and that the members of the association will do everything within their power to create harmony and establish a good feeling between all employees and the general public.

"This provision as to the wearing of buttons shall not be compulsory, but every member of the organization has the absolute right to wear it or not to wear it, as he desires.

"It is further agreed and understood that the consent of the company to revoking its order and permitting the wearing of the button is conditioned upon President Mahon's assurance that discrimination, threats of violence or injury shall be discontinued, and if, in the future, this condition shall not be fulfilled, then the right to continue wearing the button shall be a matter of arbitration."

That the railway had gaged correctly the possible trouble from the wearing of union buttons was indicated in an attack on a car the day following the end of the strike. Three men threw stones at the end of a car manned by a union conductor who had worked during the general strike. The motorman on this car was a union man who had not worked.

## \$500,000 for Improvements

**Dallas City Commission Sanctions Expenditures Under Service-at-Cost Grant of Dallas Railway**

The City Commission of Dallas, Tex., has approved applications covering proposed improvements to be made by the Dallas Railways amounting to approximately \$500,000. These improvements are to be made in accord with provisions of the service-at-cost franchise which stipulated that improvements of this amount should be made on the lines in the city. Among the improvements which have been approved are the following projects:

Purchase of twelve one-man cars to take the place of obsolete equipment, \$64,710.

Special track work at Cantegral and Bryan Streets, to enable trailers to be operated over the Bryan Street line, \$12,805.

Rebuilding 80 ft. of double track on Colorado Street at the intersection of Marsalis Avenue, made necessary by the paving of Colorado Street, \$1,920.

Purchase of a concrete mixer and other equipment for track construction work, \$16,655.

Special track construction work at Commerce and Lamar Streets, to permit routing the Oak Cliff cars to Elm Street via Lamar from Commerce, necessary under the plan to route the Oak Cliff cars for crosstown lines, \$20,720.

Removal of single track on Columbia Avenue, Beacon and Tremont Streets from Garrett to Fulton Street, so that double track may be put down, \$76,860.

## Cleveland Wage Discussion

**Proposals and Counter Proposals Made, but Prospect Is That Resort Will Have to Be Made to Arbitration**

At a second wage conference on April 19 John J. Stanley, president of the Cleveland (Ohio) Railway, made two new wage offers to the motormen and conductors, who are demanding an increase of 25 cents an hour, when their present contract expires on May 1. The first includes an increase of 5 cents an hour and a bonus of 5 cents an hour for all who worked between Nov. 1, 1917, and May 1, 1918, and are now employed by the company. This is practically the same offer made to the men last November. The contract is to run for one year from May 1.

This would mean a waiver by the company of its demand for an open shop and the employment of women, with a continuance of existing agreements on other issues. It would be a waiver by the men of their demands for a change in the working hours.

As an alternative proposition, Mr. Stanley suggested that men be employed as motormen and women as conductors, the men to have an increase of 10 cents an hour and the women to receive the present wages of the men, from 32 to 35 cents an hour. All male conductors physically able and competent would be shifted to positions as motormen.

Should both offers be rejected, Mr. Stanley demands that the issues be submitted to arbitration, with an increase in wages of 2 cents an hour pending the decision of the board of arbitration. The men fixed upon the night of April 22 to consider these proposals, with the exception of the one relating to women conductors. The exception was made because this was not included in the original letter on the proposals.

The employment of women as conductors was discussed at a conference on April 20 between Mr. Stanley and the representatives of the men. The men argued that a sufficient increase in the wage scale would induce men to seek employment with the road. Mr. Stanley made his proposition with regard to women a part of the original offer submitted on April 19.

The men replied to Mr. Stanley by stating that they would willingly co-operate in securing women for conductors if a material increase in wages did not supply enough men.

The executive board of the union notified Mr. Stanley that his proposition would be submitted to the men, but that it would probably not be accepted.

Hundreds of applications have been received from women for jobs on the cars.



## Fare Should Be Flexible

### President McCulloch Declares that Ideal Ordinance Should Permit Readjustments Under Changing Conditions

Richard McCulloch, president United Railways, St. Louis, Mo., in an address before the City Club on April 19, stated that the proposed compromise ordinance for his company lacks the ideal feature of a flexible fare provision. The course of this ordinance, which was signed by the Mayor on April 10, has been followed from week to week in these pages.

Mr. McCulloch did not indicate positively what the company would do about accepting the ordinance, but he expressed a hope that it would be accepted by "both parties." The company has one year in which to file an acceptance, or six months after the end of the war if hostilities last longer than a year.

#### OUTLINE OF ORDINANCE

According to Mr. McCulloch, the principal features of the ordinance are as follows:

1. The franchise rights of the United Railways are validated until April 12, 1948.
2. The company is required to reduce its outstanding mortgage indebtedness and capital stock to the capital value established in the ordinance.
3. A board of control, consisting of one member appointed by the city and one member appointed by the company, shall pass upon all proposed extensions, additions and betterments, and on all charges to capital account. In the event of disagreement a third temporary member shall be appointed by the St. Louis Court of Appeals.
4. The city has the right, after the expiration of ten years, and at any five-year period thereafter, to purchase the railway system at its then capital value.
5. The capital value of the property is established at \$60,000,000, plus the cost of any additions or betterments made to the property after the taking effect of this ordinance. This capital value is subject to a valuation to be made by the Missouri Public Service Commission.
6. At the expiration of the franchise, if the city grants a new franchise to another party, the city shall require this grantee to purchase the property of the company at its then capital value.
7. The rate of fare is established within the city limits at 5 cents for adults and 2½ cents for children, with the provisions that if, and when, the Missouri Public Service Commission or other legally constituted rate-making authority shall have the jurisdiction lawfully to alter these rates, then the rate of fare shall be such as shall be lawfully ordered by such authority. Free transfers are required under the same conditions.
8. The company is authorized to haul mail, express and freight under certain conditions, and may install switch tracks from its main lines for this purpose.
9. The standards of service prescribed by the Missouri Public Service Commission in its order of May 4, 1915, are written into the ordinance.
10. The company is required to pay the unpaid mail tax and interest accrued thereon (approximately \$2,300,000) in ten annual payments, the first payment being due within thirty days after the final approval of the ordinance by the city of St. Louis.
11. The United Railways is required to pay one-half of 1 per cent of its gross receipts in lieu of mill tax and all franchise taxes. This tax may be increased at any time during the life of the franchise to not exceeding 3 per cent of the gross receipts.
12. All net earnings in excess of 7 per cent of the capital value may hereafter be required by ordinance to be paid to the city as a franchise tax, or may be applied by the board of control for the reduction of fares or the reduction of capital value.

#### ORDINANCE IS NOT IDEAL

In Mr. McCulloch's opinion, the ordinance is not ideal from the standpoint of either the city or the company. It is, however, probably the best com-

promise that can be agreed upon at the present time. Continuing, Mr. McCulloch said:

"Under the circumstances a referendum vote on this ordinance, which was passed by the Municipal Assembly by a vote of twenty-eight to one would merely serve to delay a settlement which is a fairly good solution of a difficult problem. The city would be put to the expense of an election, and the company would be delayed at least six months in adjusting its affairs. No one would profit by this delay. The settlement is not an ideal one, but it is one which we hope will be accepted as a compromise by both parties.

"If you ask me to suggest the terms for an ideal franchise, I would begin by stating that with absolute regulation should come absolute protection. The only manner in which such protection can be afforded is by establishing a flexible rate of fare, which may be adjusted automatically from time to time, so as to guarantee always good service, fair wages and a sure return upon the investment. This is service at cost, and if the terms are sufficiently attractive, and if the methods of fare adjustment are not too slow and clumsy, all the capital necessary can be produced."

## Perpetual Franchise in Covington

### Federal Supreme Court Decides in Favor of South Covington & Cincinnati Street Railway

On April 15 the Supreme Court of the United States handed down a decision in the case of the city of Covington, appellant, vs. South Covington & Cincinnati Street Railway which came before the court as an appeal from the District Court for the Eastern District of Kentucky. The question at issue was whether the franchises of the company had expired.

Testimony showed that in December, 1869, an ordinance was passed by the city granting to Edward F. Abbott and others "all the right and authority that it [the city] had the capacity to grant, to construct, hold and operate a street railroad upon and along" certain streets. Soon after, the Covington & Cincinnati Railway, the predecessor of the present company, was organized.

The city claimed that in a previous street railway franchise to the Covington Street Railway, an entirely different corporation, granted in 1864, the city had declared "all contracts made under the provisions of this ordinance shall be for the term and period of twenty-five years," and that this limited the Abbott grant. The Supreme Court held otherwise, however. Under subsequent ordinances the South Covington & Cincinnati Street Railway acquired the

property of the Covington Street Railway, but the Supreme Court held that this also did not affect its perpetual franchise in the streets covered by the Abbott grant.

The court laid stress upon the authority of *Owensboro vs. Cumberland Telephone & Telegraph Co.*, 230 U. S. 58, whose authority it pronounced complete. The opinion of the court was delivered by Justice Holmes.

Justice Clarke presented a dissenting opinion, based partly upon his construction of the grant to Abbott and also because he held that the city did not have authority from the Legislature to make the grant claimed.

## Puts Himself In the Other Man's Place

### Head of Claims Department Becomes Motorman for Experience So As to Help Him in His Court Work

The testimony of the motorman is usually the first and most important information desired by the claims department in accident cases, and it is frequently essential that the attorney get an accurate understanding of the motorman's viewpoint.

In order to facilitate this, F. M. Hamilton, superintendent of the department of accident investigation of the Puget Sound Traction, Light & Power Company, Seattle, Wash., has completed the course of training prescribed for motormen and does, in fact, operate a car through the city streets frequently enough to "keep in practice."

He says that the advantage which this gives him in discussing accidents with motormen has been notable, and it has become known among the company's men that statements about the action of brakes, the distance required to bring a car to a stop, etc., will be questioned intelligently by the legal department.

In addition to a better understanding of the motorman's point of view, experience in operating the car enables the attorney to present his case more convincingly when questions arise in the court, and altogether the expenditure of the time required to become proficient as a motorman is pronounced an excellent investment.

## Moderation in Toledo

### Railway Men, Recognizing Problems of the Company, Against Hasty or Insistent Action

It was reported that the motormen and conductors of the Toledo Railways & Light Company, Toledo, Ohio, issued an ultimatum on the evening of April 17 in which the company was given forty-eight hours to decide upon an increase of 10 cents an hour in the wage scale. Afterward officers of the union stated that the action was not intended as an ultimatum, but that the men are anxious to arrive at a settlement just as soon as possible.

Frank R. Coates, president of the company, said that the men should have

an increase in consideration of the prevailing high prices of every necessity, but the company could grant the demand only on condition that the city consent to a raise in the rate of fare to 8 cents.

On the evening of April 18 Federal Mediator A. L. Faulkner, Cleveland, addressed the Central Labor Union. He declared that the only way the company could grant an increase was by securing a higher rate of fare. He believed the recent audit of the books to be correct. That investigation showed that the high cost of materials and operation has so increased the company's expenses that it could not pay the men more without additional income. Mr. Faulkner advised the labor organizations to take the lead in seeking permission for an increase in the rate of fare as a means for securing sufficient funds to allow the company to grant the men's demands. Mr. Faulkner advised against a strike.

The men were to vote upon the question of a strike after this meeting. The Central Labor Union approved their contention, but advised moderation in the steps taken to enforce their demands. The men discussed the question in a broader manner at their meeting and decided to delay action pending plans for placing the question of higher rates of fare and lighting service before the voters for consideration.

### Arbitration in Minnesota

Submission of all labor disputes in Minnesota to arbitration during the period of the war is ordered by the Minnesota Public Safety Commission in an action taken following conferences of representatives of both employees and employers with Governor J. A. A. Burnquist. The order merely makes effective an agreement by both employers and employees, secured by the Governor's activities.

The order of the Public Safety Commission follows recommendations submitted by the board of arbitration made up of Raymond F. Schroeder, St. Paul, representing organized labor, and Robert F. Pack, Minneapolis, representing employers of labor, after a series of conferences with Governor Burnquist to carry out a plan initiated in a recent proclamation issued by the Governor.

An amiable adjustment of the differences between the Twin City Rapid Transit Company, Minneapolis, and its employees, providing for restoration of former employees, is being made through the State board of arbitration and conciliation.

### Detroit Men to Arbitrate

The strike of the trainmen in the employ of the Detroit (Mich.) United Railway, declared on April 25, will be settled by arbitration. The men had demanded an increase in wages which would have aggregated about \$1,000,000 for the year. Operations of the railway are said to have been pretty completely suspended during the few hours the men were out.

## Civic Associations Would Aid

### Propose to Help Portland Company by Securing Elimination of Charges Not a Part of Railway Operation

The City Council of Portland, Ore., on April 16 voted to submit to the voters at the special election on May 17 the question of opening a way for the elimination of paving, bridge tolls and other charges now imposed on the Portland Railway, Light & Power Company. These charges enter into the general burden on the company which finally made necessary a 6-cent fare.

#### CIVIC ASSOCIATION'S HELP MOVEMENT

The measure has been prepared by eight civic organizations of the city which are striving in a fair way to bring about a return of the 5-cent fare. It is merely an enabling act giving the City Council power to eliminate these charges if such action is considered advisable or reasonable. The act itself does not alter the charges, but places in the Council's hands the power to take such action or to reinstate the charges. The act carries a provision for a special tax levy of four-tenths of a mill (\$112,000) to make up for the city the revenue that would be lost by such an arrangement.

L. M. Lepper, secretary of the East Side Business Men's Club of Portland, in a letter to the Public Service Commission of Oregon, informed the commission that committees representing eight civic clubs of Portland have drawn amendments to the Portland city charter for the elimination of certain charges required of the company, to the end that the fare be set back to 5 cents. The letter further stated:

"If the City Council places such amendments on the ballot at the coming election, and they are voted by the people, enabling the Council to eliminate such charges, and the Council does eliminate them, and conditions remaining as they are at present as to prices, upkeep, etc., then and in that event, when so eliminated, will you, the Public Service Commission, now indicate and promise that immediately upon such elimination and relief to the company, you will order fares back to 5 cents?"

#### COMMISSIONERS STATE THEIR ATTITUDE

In two answers to Mr. Lepper's communication the Public Service Commission made plain its attitude as to the reduction of fares in the city of Portland, in the event of passage of the city charter amendments. The commission in effect declares that action by it will depend largely upon conditions existing at the time the amendments go into effect.

One of the answers is signed by Commissioners Miller and Corey, as a majority of the commission, and the other by Commissioner Buchtel. After reciting the query from Mr. Lepper as to the commission's attitude, Commissioners Miller and Corey say, in part:

"The increased fare was ordered only after we had satisfied ourselves that

such increase was absolutely necessary to preserve the integrity of the property for the use of the public and prevent the company going into bankruptcy. No allowance whatever was made for a return on the company's investment, nor was sufficient increase allowed to provide for extra operating costs.

"During the period of the war, or until conditions again become normal, the company must forego any interest on the money now invested in this utility and share with the public the burdens imposed by present unusual situations.

"If it is right, just and proper for the rider to continue to pay for paving, bridge tolls, free transportation of city employees, license taxes, etc., assessed against the company, then no effort should be made to remove such burdens, but if on the other hand it is not fair and equitable for the patrons of the company to pay such charges, then they should be removed.

"Should the company be relieved from the necessity of paying these above mentioned charges, this commission will take full and complete cognizance thereof and make such reductions in fares as reductions in operating costs or increase in revenue will permit, bearing in mind the necessity of maintaining the present rate of wages paid to employees, the existing conditions and adequate service.

"Whenever it becomes possible to order the return to a 5-cent fare we will gladly do so."

Commissioner Buchtel states if it develops that a 5-cent fare is sufficient for successful operation of the company he will not hesitate to move to have it reinstated.

### Railway Conservation Study Proposed

The commercial economy board of the Council of National Defense has arranged with Addis Whitney, Boston, Mass., to come to Washington in the near future to study and report on opportunities in conservation among the public utilities of the country as a war measure.

The board, of which A. W. Shaw, Chicago, Ill., is chairman, has been instrumental in bringing about various economies in different industries, notably among department stores, laundries, etc., by eliminating overlapping deliveries, preventing the return of goods sent on approval, etc.

Mr. Whitney has made a preliminary visit to Washington for conferences with officials and has returned to his home in Boston. It is expected in Washington that two or three weeks will be required for his study. Mr. Shaw states that the survey to be made by Mr. Whitney will take in possibilities of conservation in the use of capital, material, etc., used by the electric railways.

## News Notes

**Mayor Signs St. Louis Ordinance.**—Mayor Kiel of St. Louis, Mo., has signed the ordinance extending the franchise of the United Railways to April 12, 1918. An outline of the terms of the measure made by President McCulloch of the company is published elsewhere in this issue.

**Wage Increase in Omaha.**—The Omaha & Council Bluffs Street Railway, Omaha, Neb., has granted a voluntary increase in wages of 2 cents an hour to the operating force of the company, and has authorized the readjustment of the wages of the other employees of the company. This is the third voluntary increase of wages made by the company since the war began.

**Wage Advance in Honolulu.**—A voluntary increase was made on April 1 by the Honolulu Rapid Transit & Land Company, Honolulu, H. I., in the wages of its platform men. The scale formerly ranged from 30 cents for the first year to 40 cents for the eleventh year, an advance of 1 cent each year. The increase of 1917 added 10 per cent to these rates. The rates just adopted range from 35 cents for the first year to 45 cents for the eleventh year.

**New Offices for International Railway.**—Executive offices of the International Railway, Buffalo, N. Y., which have been located on the eighth floor of the Ellicott Square Building for almost twenty-five years, will be moved on May 1 to the Littell Building at Franklin and West Huron Streets. All of the company's other offices with the exception of those located at the Virginia Street station will be moved to the new location.

**Wage Increase Asked in Worcester.**—Conductors and motormen in the employ of the Worcester (Mass.) Consolidated Street Railway have presented to the management of that company a request for an increase in wages and a readjustment of the working conditions. While the terms of the request have not been disclosed, it is believed the men ask for a minimum of 30 cents an hour. The wages now range from 28½ to 34½ cents an hour.

**Wage Arbitration in Dubuque.**—The threatened strike of the railway employees of the Dubuque (Iowa) Electric Company has been prevented, both sides agreeing to submit the question to arbitration. The men are asking for a wage increase of approximately 25 per cent. Governor Harding has appointed Judge S. F. Prouty, Des Moines, as arbiter for the Dubuque Electric Company and Judge M. C. Chambers, Dubuque, as arbiter for the men. These two will decide between themselves upon the third arbiter.

**Gross Receipts Tax Suit.**—On April 20 arguments on the demurrer of the Puget Sound Traction, Light & Power Company against the suit of the city of Seattle, Wash., to collect \$72,443, as 2 per cent of the gross receipts of the company's earnings for 1917 was heard in the Superior Court. A similar action in 1916, in which judgment was granted against the company, is on appeal before the Supreme Court. This year the company offered to pay the amount if relieved of other obligations under its franchise. The city of Seattle refused the offer.

**Cincinnati Franchise Revision Hearings May 11.**—Public hearings for a discussion of terms which shall go into a revision of the franchise held by the Cincinnati (Ohio) Traction Company will be started on May 11 by the committee on street railroads of the Council under the terms of a resolution drawn up at a meeting of the committee for submission to the City Council. The resolution recites that the Council has had up for consideration the matter of revising the terms and conditions of the franchise, as provided by law and that this revision "is not yet completed."

**Sir Adam Beck Favors Utility Monopolies.**—Sir Adam Beck, chairman of the Hydro-Electric Power Commission of Ontario, Canada, presented a strong argument before a committee of the United States House of Representatives in Washington on April 15. In speaking before the joint special water-power committee of the House, on the so-called "administration" water-power bill now under consideration by that body, the chairman of the Ontario Commission described some of the difficulties which have confronted the public and the public utilities in and around Ontario in recent years, and some of the work that has been done and some that remains to be done in developing electrical energy.

**Wage Discussion in Salt Lake.**—Negotiations are pending looking to the settlement of differences about wages and working conditions existing between the Utah Light & Traction Company, Salt Lake City, Utah, and its employees. The principal point of difference appears to be over the use of one-man cars. The company has demanded that this point be discussed with that of the proposed wage increase. The men deny the right of the company to inject this point into the discussion at this time. The company has requested that the question be submitted to arbitration along with the wage matter.

**Wage Advance and Increase in Fares Suggested.**—James J. Barrett, federal commissioner of conciliation, who has been in Des Moines, Iowa, in an effort to settle the wage dispute between the master builders and their laborers, has filed a report with the City Council in which he states that he has investigated the wage conditions of the employees of the Des Moines City Railway and thinks that their request for an increased wage should be granted. In his opinion that section of the City

Railway's franchise which provides six-for-a-quarter tickets should be eliminated and a straight 5-cent fare established. Mayor Thomas Fairweather states that the only way the franchise can be changed as to rates is by a vote of the people.

**Kansas City Police Reinstated.**—An echo of the strike of August, 1917 of the employees of the Kansas City (Mo.) Railways was heard at the city hall recently when the Board of Police Commissioners reinstated twenty-eight policemen. These men were discharged during the strike for refusing to ride on cars with strike breakers. It will be remembered that in several cases policemen had refused to protect electric railway property against strike breakers, and had failed to make arrests of strikers and sympathizers who were threatening and actually committing depredations and attacking employees of the company. During the recent sympathetic strike the police promptly gave all the protection possible with the number of men in the service. In this case the work of the police was supplemented by troops from the Missouri National Guard.

## Programs of Meetings

### National Association of Manufacturers

The National Association of Manufacturers will hold a meeting in New York on May 20-22. The headquarters will be at the Waldorf-Astoria Hotel.

### National Electric Light Association

The thirty-fourth annual meeting of the National Electric Light Association will be held at the Hotel Traymore, Atlantic City, on June 13 and 14.

This will be a strictly business meeting, without entertainment of any kind. It will concern itself entirely with the vital problems of the industry arising out of the war. No papers will be read. Reports from committees and individuals and discussions will be confined to matters of major importance, and the brief two days will allow no time for the usual helpful discussions on general topics relating to the progress of the art.

### National Lumber Manufacturers' Association

The sixteenth annual meeting of the National Lumber Manufacturers' Association, postponement of which was noted in the *ELECTRIC RAILWAY JOURNAL*, issue of April 6, will be held on May 20 and 21 at the Congress Hotel, Chicago.

Postponement of the meeting as originally arranged for April 8 and 9 has been due to an unanticipated call from Washington upon the leaders in the lumber manufacturing industry. There is a possibility of further postponement as the lumber manufacturers' association takes the stand of Washington first and annual meetings second, but it is believed that no further delay will develop to prevent the program from being carried out on May 20 and 21.

# Financial and Corporate

## Receivers for Pittsburgh

Messrs. Callery, Stewart and Fagan Will Manage Affairs of Much-Harassed Electric Railway

James D. Callery, H. S. A. Stewart and Charles A. Fagan were appointed receivers for the Pittsburgh (Pa.) Railways on April 23 by Judges W. H. S. Thomson and Charles P. Orr in United States District Court. They organized during the afternoon and made temporary arrangements for the operation of the company's property.

### WHO THE RECEIVERS ARE

Mr. Callery is chairman of the board of directors of the Pittsburgh Railways. He has been made chairman of the receivers. Mr. Fagan is a leading attorney. Mr. Stewart is vice-president of the Fidelity Title & Trust Company, Pittsburgh. He was an associate of the late C. L. Magee in the building of many of the railways now included in the system of the Pittsburgh Railways.

After the receivers had organized, Mr. Callery made the following statement:

"There is misapprehension as to the receivers representing particular interests. All the receivers represent the stockholders of the company, its creditors and the public. There is every reason to believe that there will be harmonious action to protect all these interests. We shall hold daily meetings and in a few days will likely be ready to announce the policy which will guide us. Our work to-day was merely to make temporary agreements for the carrying on of the customary business to the end that the service to the public shall not suffer any interruption by reason of the change in control."

The system will continue to be operated under P. N. Jones as general manager. Other officers and employees of the Pittsburgh Railways were appointed to positions necessary to be filled immediately under the receivership. The negotiations for a new wage scale will be continued as heretofore.

In addition to the appointment of Mr. Callery as their chairman and that of Mr. Jones as general manager of the operation of the railway system the receivers on April 23 appointed J. L. Foster treasurer to succeed C. J. Braun, Jr.; E. E. Ebrauz secretary, and J. A. Meade auditor. The continued employment of subordinate clerks and other employees was provided for.

It is reported that S. L. Tone will be retained as consulting engineer.

Present for the Pittsburgh Railways at the hearing in court were President S. L. Tone, Manager Jones and Attorneys D. W. Smith and A. W. Robert-

son. Attorney George B. Gordon was on hand for the American Brake Shoe & Foundry Company of Delaware and the St. Louis Car Company, St. Louis, Mo., in whose names the application for the receiver was made.

In the order appointing the receivers the court directed them to give bond in the sum of \$25,000 each. This they did later in the day.

## Refinancing in Washington

Slowness in Organizing War Finance Corporation Embarrassing to Utilities—Capital Issues Committee Reduces Minimum

The delay in the organization of the War Finance Corporation, the enabling act for which was recently signed by President Wilson, has been seriously worrying a number of large public utilities having finance maturities on May 1. Reports reaching Washington show that between \$15,000,000 and \$20,000,000 of utility securities will in all likelihood go by default on May 1 unless there is assistance from governmental sources.

Undoubtedly the administration recognizes this fact, and in spite of the demands for time made upon many of the leading officials in connection with the Liberty Loan campaign, is taking steps to complete the organization of the War Finance Corporation. On April 25 it was reported from Washington that the nominations of four men to be directors of the corporation had been decided upon and would be announced shortly.

At its meeting April 23, the capital issues committee of the Federal Reserve Board adopted the following resolution:

"Resolved, that, effective immediately, this committee reduce from \$500,000 and over to \$100,000 and over the minimum of security issues of industrial and public utility corporations that it will consider."

This action is taken by the committee in furtherance of its policy heretofore expressed of adapting its methods to those prescribed for the guidance of the capital issues committee created by the war finance corporation act which, in Section 203, provides that the committee may consider applications of \$100,000 and over.

The committee has heretofore observed the \$100,000 minimum only with respect to municipal issues. Its action on Tuesday will tend to relieve the embarrassment of those desiring to issue at this time securities the aggregate of which is above the minimum prescribed by the statute and yet below the minimum heretofore considered by the existing committee.

## Inland Empire Faced Hard Problems

Interurban Passenger Situation Improved in 1917, but Poor Crops Hurt Freight Traffic

That the private ownership of automobiles for pleasure purposes has reached its peak is intimated in the annual report of the Spokane & Inland Empire Railroad, Spokane, Wash., for the calendar year 1917. The slight decrease in interurban passenger earnings, only 1.6 per cent, as compared to large decreases in previous years, is taken as a favorable sign.

### EVEN FREIGHT EARNINGS DECREASE

The freight earnings on the interurban lines decreased \$42,098, or 12 per cent, during 1917. The decrease was due almost entirely to the poor grain crop caused by the unusual condition of a late, cold spring and a hot, dry summer. The grain traffic handled was approximately 819,747 bushels, as compared to 1,390,168 bushels for the previous year. During the latter half of 1917 the shipment of lumber was seriously curtailed by the car shortage, and the company has been short of sufficient equipment to handle the business offered.

The territory served by the interurban lines has a better crop prospect than last year and the prices fixed by the government guarantee a good return, so that a large movement of agricultural products may be expected. There is also a good prospect of a heavy movement of lumber during the coming season, provided the necessary supply of equipment can be obtained to handle it.

The revenue from the operation of the street car lines in the city of Spokane showed an increase of \$4,542 or 1 per cent as compared with last year. The increase in revenue from other sources amounted to \$28,022 or 40.7 per cent, owing largely to rental received for equipment held by foreign lines on account of the congestion of traffic in Eastern states. The total railway revenue decreased \$15,095 or 1.2 per cent.

### OPERATING EXPENSES CLIMB

The operating expenses show a substantial increase in every department except cost of power, which fell off \$56,244 or 55.8 per cent. As the contract with the Washington Water Power Company has expired, the company's lines are now operated entirely by power from its own station. The total expenses rose \$20,583 or 1.8 per cent.

The net revenue from railway operations, therefore, fell off \$35,649 or 34.1 per cent. The revenue from auxiliary operations also decreased 24 per cent, while taxes and income deductions rose 7.2 per cent and 5.7 per cent respectively, so that the net return of the year was a deficit of \$462,001 as compared to \$359,953 in 1916, an increase of 28.4 per cent.



The Adamson law forced heavy increases in wage schedules of motormen and trainmen, and the company made voluntary increases in the compensation of other employees to meet the high

last winter on petition of Mrs. Margaret Milford and other creditors, who held a large amount of bonds issued by the company. The line had not been operated for some time.

COMPARATIVE INCOME STATEMENT OF SPOKANE & INLAND EMPIRE RAILROAD  
FOR CALENDAR YEARS 1917 AND 1916

	1917		1916	
	Amount	Per Cent	Amount	Per Cent
Freight.....	\$ 307,946	25.1	\$ 350,045	28.2
Passenger.....	352,297	28.7	357,859	28.8
Street railway system.....	469,712	38.3	465,170	37.5
Other revenue.....	96,952	7.9	68,928	5.5
Total railway operating revenue.....	\$1,226,909	100.0	\$1,242,005	100.0
Way and structures.....	\$ 296,539	24.2	\$ 293,594	23.7
Equipment.....	295,470	24.1	254,556	20.5
Power.....	44,533	3.6	100,778	8.1
Conducting transportation.....	384,074	31.3	354,245	28.5
Traffic.....	17,856	1.4	17,120	1.4
General and miscellaneous.....	124,441	10.1	121,059	9.7
Transportation for investment—credit.....	5,030	0.4	4,045	0.3
Total railway operating expenses.....	\$1,157,864	94.4	\$1,137,311	91.6
Net revenue from railway operations.....	\$ 69,045	5.6	\$ 104,694	8.4
Auxiliary operations—net.....	86,689	7.1	117,824	9.5
Net operating revenue.....	\$ 155,734	12.7	\$ 222,518	17.9
Taxes accrued.....	121,467	9.9	113,356	9.1
Operating income.....	\$ 34,267	2.8	\$ 109,162	8.8
Other income.....	4,667	0.4	4,616	0.4
Gross income.....	\$ 38,934	3.2	\$ 113,778	9.2
Deductions.....	500,936	40.8	473,731	38.1
Deficit.....	\$ 462,002	37.6	\$ 359,953	28.9

cost of living and to equalize the compensation of its employees with that paid by other lines.

### Grant Park Road Sold for Junk

The sale of the property of the St. Louis, Lakewood & Grant Park Railway, St. Louis, Mo., an electric line which operated over the Gravois road and in St. Louis County, was approved on April 17 by the Circuit Court. The road was sold for junk recently by a receiver appointed by the court, to M. Hoffman & Company, who bid \$20,527 for the steel rails and other equipment, including three cars. The railroad, of which Henri Chouteau was president, was placed in the hands of a receiver

### Electric Railway Statistics

Returns for January, 1917 and 1918,  
Show Great Decrease in Net Earnings, Especially in East

A comparison of electric railway statistics for January, 1918, with figures for the corresponding month of 1917, made by the information bureau of the American Electric Railway Association, indicates an extraordinary decrease in net earnings and operating income. This condition is particularly noticeable in the East, where the severe weather, as well as the curtailment of service due to fuel shortage, disastrously affected both the earnings and the expenses.

Data for January, representing 7670

miles of line of companies scattered throughout the country, figured on the per mile of line basis, indicate a decrease in operating revenues of 0.29 per cent, an increase in operating expenses of 12.59 per cent and a decrease in net earnings of 24.38 per cent. Data representing 5753 miles of line show an increase in the amount of taxes paid of 4.55 per cent and a decrease in operating income of 37.91 per cent.

#### REASONS FOR SHOWING

The returns from the city and inter-urban electric railways, as shown in detail in the accompanying table, have been classified according to the following geographical grouping: Eastern District—East of the Mississippi River and north of the Ohio River. Southern District—South of the Ohio River and east of the Mississippi River. Western District—West of the Mississippi River.

Of the three groups shown, all indicate a considerable increase in operating expenses, while only one, the Western, displays an increase in operating revenues. As pointed out above, this condition is largely due to both the unusually severe winter and the acute fuel shortage which the Eastern district in particular has had to face. Returns for the latter group indicate a decrease in earnings of 2.29 per cent, an increase in operating expenses of 13.80 per cent and a consequent decrease in net earnings of 33.33 per cent.

As compared with the Eastern group, the Southern and Western have done comparatively better, though even the South shows a decrease in net earnings of 12.65 per cent, and the West one of 6.20 per cent.

#### OPERATING RATIO CLIMBING

The operating ratio for all groups has increased, particularly that of the Eastern district. The operating ratio for the country as a whole has increased from 65.19 per cent in 1917 to 73.60 per cent in 1918.

COMPARISON OF REVENUES AND EXPENSES OF ELECTRIC RAILWAYS FOR JANUARY, 1918 AND 1917

Account	United States				Eastern District				Southern District				Western District			
	Amount, January, 1918		Per Mile of Line		Amount, January, 1918		Per Mile of Line		Amount, January, 1918		Per Mile of Line		Amount, January, 1918		Per Mile of Line	
			1918	1917			1918	1917			1918	1917			1918	1917
Operating revenues.....	13,239,752	\$1,726	\$1,731	+0.29	\$8,517,827	\$1,580	\$1,617	+2.29	\$1,051,146	\$1,248	\$1,259	+0.87	\$3,670,779	\$2,555	\$2,417	5.71
Operating expenses.....	\$9,744,672	1,270	1,128	12.59	6,531,970	1,212	1,065	13.80	672,583	799	745	7.25	2,540,119	1,768	1,578	12.04
Net earnings.....	3,495,080	456	603	+24.38	1,985,857	368	552	+33.33	378,563	449	514	+12.65	1,130,660	787	839	16.20
Operating ratio, per cent.....	1918, 73.60; 1917, 65.19				1918, 76.69; 1917, 65.84				1918, 63.99; 1917, 59.19				1918, 69.20; 1917, 65.31			
Average number of miles of line represented.....	1918, 7,670; 1917, 7,534				1918, 5,391; 1917, 5,322				1918, 842; 1917, 788				1918, 1,437; 1917, 1,424			

COMPANIES REPORTING TAXES

Operating revenues.....	\$9,351,628	\$1,625	\$1,642	+1.04	\$5,614,239	\$1,361	\$1,412	+3.61	\$457,543	\$1,266	\$1,247	1.52	\$3,279,846	\$2,592	\$2,500	3.68
Operating expenses.....	7,177,903	1,248	1,110	12.43	4,592,148	1,114	982	13.44	287,681	796	692	15.03	2,293,074	1,812	1,641	10.42
Net earnings.....	2,173,725	377	532	+29.14	1,017,091	247	430	+42.56	169,862	470	555	+15.32	986,772	780	859	+9.20
Taxes.....	660,671	115	110	4.55	414,786	101	95	6.32	39,931	110	110	...	205,954	163	161	1.24
Operating income.....	1,513,054	262	422	+37.91	602,305	146	335	+56.42	129,931	360	445	+19.10	780,818	617	698	+11.60
Operating ratio, per cent.....	1918, 76.76; 1917, 67.58				1918, 81.88; 1917, 69.57				1918, 62.88; 1917, 55.49				1918, 69.91; 1917, 65.65			
Average number of miles of line represented.....	1918, 5,753; 1917, 5,668				1918, 4,126; 1917, 4,058				1918, 361; 1917, 358				1918, 1,266; 1917, 1,252			

† Decrease.



# Ware & Brookfield Sold to Junk Dealers

The property of the Ware & Brookfield Street Railway, Ware, Mass., was sold at auction on April 22 to the Swift-McNutt Wrecking & Junk Company, Boston, for \$51,000. The road comprises 11 miles of track and a carhouse built in 1917 at a cost of about \$30,000. The property was built twelve years ago at a cost of about \$200,000. Service was furnished between Ware and West Brookfield, 7 miles, and between Ware and Gilbertville, 4 miles. J. Edward Brooks, Milton, Mass., was the principal stockholder. The road has lately been operating at a loss of nearly \$1,000 a month; service was discontinued on Feb. 3, 1918. John F. Lambert, superintendent of the road for eleven years, has been retained by the wrecking company to supervise the removal of the material. The purchasers plan to dismantle the poles, tear up the tracks and dispose of the whole equipment as junk. Ware and the surrounding towns are said to be greatly disturbed at the prospect of losing the road, and it is expected that an effort will be made to reach an agreement whereby operation can be resumed and continued.

## Financial News Notes

**City Protests Abandonment.**—A protest by the city of Sapulpa, Okla., against the abandonment of certain portions of the urban lines of the Sapulpa Electric Interurban Railway was heard on April 6 by the State Corporation Commission. The case was taken under consideration by the commission.

**Receiver for Small Road.**—Following the filing of a suit by the Sheldon Coal Company, one of the creditors, in the Lewis County Superior Court on April 16, the Washington Electric Railway was placed in the hands of Dan Bush as receiver by Judge Reynolds. This property is now understood to be included in the system of the North Coast Power Company, Vancouver.

**Woodstock-Sycamore Line Quits.**—The Woodstock & Sycamore Traction Company, organized ten years ago and operating gasoline cars between Sycamore and Marengo, Ill., has been dissolved and the ties, rails and equipment will be sold for junk. The road as originally planned was to extend from Sycamore to Woodstock, but only the portion between Sycamore and Marengo, a distance of 25 miles, was constructed.

**Foreclosure Decree Signed.**—The decree of foreclosure in the Northern Electric Railway litigation was signed on April 16 by Federal Judge M. T. Dooling. Simultaneously, the court appointed United States Commissioner Francis Krull special master to sell the physical properties of the system at auction in Sacramento at a date to be agreed upon later. The sale, however, is expected to take place in six weeks. The company operates 217 miles of

electric railway from Chico, Cal., as a center. The affairs of the company were reviewed in the *ELECTRIC RAILWAY JOURNAL* of April 6, page 676.

**Massachusetts Railway Suspends.**—The Plymouth & Sandwich Street Railway, Plymouth, Mass., has discontinued service. The road was built a number of years ago, but six years ago a franchise was secured to extend the lines to Sandwich. At that time the town agreed to subscribe to the capital stock to the amount of \$50,000, to be paid when, in the opinion of the Selectmen, the road was built, fully equipped and operated. Nothing was done for about five years, when last fall the road was finished as far as Sagamore station. The company then called upon the town for the \$50,000. The town refused, and the matter went to court. The court finally upheld the town.

**Dan Patch Prospects Brighter.**—Reorganization of the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, the Dan Patch line, took definite form recently when residents along the line turned over \$15,000 in cash, the second payment on the \$25,000 indemnity bond required by the court to guard against a drop in the value of the material used in the line as scrap should that part of the property about which the present action hinges eventually have to be sold as junk. A similar sum will be paid within thirty days on the purchase price of \$250,000. It is expected that by the time payments are completed every resident along the Dan Patch will be interested in the property as a stockholder. The new organization contemplates operating both divisions of the road, including the 14-mile cut-off between the Auto club and the Luce Line junction, as well as the main line to Northfield. The cut-off has not been operated under the existing receivership. W. L. Harris, John B. Irwin, Minneapolis; W. F. Roche, Lakeville, and R. H. Benham, comprise the reorganization committee.

# Regina Municipal Line Losses

The Regina (Sask.) Municipal Railway during 1917, according to the certified figures of auditors, showed receipts of \$321,727 and operating expenses of \$199,572. The operating surplus, therefore, amounted to \$32,154, but after taking into account fixed charges of \$96,066 the company had left for the year a deficit of \$63,912. The company recently put into effect changes in fares estimated to give increased revenue of \$31,700. During the discussion in connection with these changes it was stated before the City Council that the cost of carrying a passenger was 6.57 cents, while the receipts were only 4.6 cents.

## Electric Railway Monthly Earnings

### BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Feb., '18	\$67,485	*\$51,493	\$15,992	\$19,942	†\$3,950
1m., Feb., '17	68,776	*40,521	28,255	18,933	9,322
12m., Feb., '18	887,921	*520,282	367,639	230,385	137,254
12m., Feb., '17	844,757	*475,477	369,280	217,077	152,203

### BATON ROUGE (LA.) ELECTRIC COMPANY

1m., Feb., '18	\$19,847	*\$10,644	\$9,203	\$3,717	\$5,486
1m., Feb., '17	18,821	*8,685	10,136	3,513	6,623
12m., Feb., '18	234,074	*122,512	111,562	43,071	68,491
12m., Feb., '17	215,983	*101,794	114,189	42,148	72,041

### BROCTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

1m., Feb., '18	\$7,192	*\$8,536	†\$1,344	\$1,328	†\$2,672
1m., Feb., '17	7,714	*8,709	†995	1,161	†2,156
12m., Feb., '18	122,336	*124,212	†1,876	15,145	17,021
12m., Feb., '17	123,986	*112,804	11,182	13,379	†2,197

### CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.

1m., Feb., '18	\$137,791	*\$106,144	\$31,647	\$30,565	\$1,082
1m., Feb., '17	102,594	*68,653	33,941	32,062	1,879
12m., Feb., '18	1,422,833	*1,211,754	211,079	361,669	†150,590
12m., Feb., '17	1,246,829	*844,466	402,363	362,786	39,577

### COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO

1m., Feb., '18	\$347,374	*\$263,064	\$84,310	\$54,119	\$30,191
1m., Feb., '17	316,318	*224,677	91,641	44,961	46,680
12m., Feb., '18	4,085,333	*3,055,742	1,029,591	576,221	453,370
12m., Feb., '17	3,613,172	*2,219,872	1,393,300	520,107	873,193

### EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Feb., '18	\$80,408	*\$44,520	\$35,888	\$12,851	†\$26,183
1m., Feb., '17	73,006	*39,179	33,827	9,783	24,044
12m., Feb., '18	950,583	*529,923	420,660	143,591	†303,137
12m., Feb., '17	848,403	*454,299	394,104	109,456	284,648

### EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

1m., Feb., '18	\$311,063	*\$224,992	\$86,071	\$66,648	\$19,423
1m., Feb., '17	268,158	*172,293	95,865	63,969	31,896
12m., Feb., '18	3,742,457	*2,602,427	1,140,030	789,792	350,304
12m., Feb., '17	3,131,624	*1,913,180	1,218,444	759,411	459,033

### JACKSONVILLE (FLA.) TRACTION COMPANY

1m., Feb., '18	\$66,003	*\$47,244	\$18,759	\$17,030	\$1,729
1m., Feb., '17	53,931	*37,312	16,619	15,493	1,126
12m., Feb., '18	716,590	*488,380	228,210	190,752	37,458
12m., Feb., '17	637,103	*429,440	207,663	185,495	22,168

### LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, ME.

1m., Feb., '18	\$42,254	*\$63,085	†\$20,831	\$15,762	†\$36,593
1m., Feb., '17	54,793	*51,350	3,443	15,444	†12,001
12m., Feb., '18	871,251	*714,234	157,017	187,610	†30,593
12m., Feb., '17	816,699	*579,192	237,507	186,476	51,031

### PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

1m., Feb., '18	\$577,581	*\$327,385	\$250,196	\$177,792	\$72,404
1m., Feb., '17	459,908	*243,101	216,807	181,016	35,791
12m., Feb., '18	6,240,740	*3,745,515	2,495,225	2,145,385	349,840
12m., Feb., '17	5,568,929	*3,030,719	2,538,210	2,178,685	359,525

\*Includes taxes. †Deficit. ‡Includes non-operating income.

# Traffic and Transportation

## Strang Line Seeks Increase

Kansas Institution Forced to Appeal to Public Service Commission for Fare Increase

A hearing was held in Olathe, Kan., on April 16 by the Public Utilities Commission of Kansas on the application of the Missouri & Kansas Interurban Railway, operating 22 miles of line, for an increase in rates to a straight 3-cents-a-mile basis.

### HOW THE COMPANY HAS FARED

The company's petition and arguments urged that immediate relief was needed to prevent a complete withdrawal of service within the next few months. The plea is one of emergency, and the company did not go into the matter of valuation. It had suggested to the commission that it send engineers to go over the line, and accountants to examine the books, preliminary to the hearing, to get independently of the petition, the information that would disclose the necessity for the higher rates. The commission answered that this was unnecessary, in view of the short time intervening between the appeal and the hearing.

The property was bonded about five years ago for \$30,000 a mile. It has always paid its interest, and each year, until 1917, put some surplus back into the road, a total of \$21,000 having been so disposed from 1913 to 1916. In 1917 the revenue from passenger service was about \$94,000 and from freight about \$16,000. That year the company put about \$2,000 into renewals and showed a deficit of about \$700. No dividends have ever been paid, but business had developed to a point where this could probably have been done. Then came the unusual conditions resulting from the war.

### TWO CENTS A MILE PRESENT CHARGE

The railway has been operating with a 2-cents-a-mile rate on through traffic. Its largest business, however, was from the people who had homes along the line. There were eight zones between Olathe and Kansas City—about 2½ miles in each zone, in which there were 5-cent fares, and from which toward either terminus there was an additional 5-cent fare from the point of origin. In many cases there were two or three stations in each zone. The company also sold commutation tickets, the price being based on twenty-five trips a month at half fare for the round trip. The tickets for use between Olathe and Kansas City sold for \$10 and those between nearer points and the city at the same relative price of 1 cent a mile. Books with a smaller number of trips a month were sold on the basis of 1½

cents a mile, the distances, however, being figured by zones. One result of the system was that it is difficult now to estimate the distances traveled by the holders of books.

The company has encountered perhaps even more than the usual difficulties of electric railway operation during the past year. The inability of the Kansas City Railways to provide all the current the line needed last winter made necessary the withdrawal of its through cars from Olathe. In addition the company had before this been forced to shut down its own generating station at Overland, because of the shortage of natural gas. Its plant at Olathe requires replacement in the near future.

### THREE CENTS A MILE SUGGESTED

The company represented to the commission that a straight 3-cents-a-mile rate would probably reduce the traffic 15 per cent, but would yield a possible passenger revenue of \$124,000 a year. This, with the \$16,000 freight business, would provide revenue sufficient for necessary renewals and replacements, and the maintenance of service.

## Ten One-Man Cars for Use on Middlesex & Boston

Before the Massachusetts Public Service Commission at Boston on April 17, G. M. Cox, vice-president and general manager of the Middlesex & Boston Street Railway, stated that ten one-man cars will be placed in service on the road in the near future. Six new cars of this type are to be delivered in the latter part of May, and the company is to rebuild four cars for one-man operation.

The commission has authorized the use of such cars on ten lines. The six new cars weigh about 6½ tons each. The old cars which are to be rebuilt weigh about 9½ tons. All the one-man cars will be equipped with safety devices.

The use of these cars represents the company's best effort to render service without tearing up tracks. On the Lexington-Woburn line it is estimated that the saving by operating a one-man car will total \$1,940 a year, exclusive of the power economies. Mr. Cox said that he was informed on a recent trip to the Brockton & Plymouth Street Railway that the two one-man cars in service on that road are saving materially in power compared with the ordinary two-men cars. He emphasized his belief that the removal of tracks was against the best interests of the State and said that existing lines were an asset even for occasional use by non-residents of the territory in which the company operates.

## Return to Five-Cent Unit

Large Massachusetts Company Wants This as Basic Fare With Short Outside Zones

The Massachusetts Northeastern Street Railway, Haverhill, Mass., has filed with the Public Service Commissions of Massachusetts and New Hampshire a new tariff asking that the same be made effective on May 15.

The company's present tariff is on the basis of 5-cent fares except as to its Haverhill-Lawrence line, and a number of sections in Haverhill and Lawrence where limited distances can be traveled on 5-cent tickets. Under this tariff the company's passenger revenue increased 8.7 per cent for the year ended Dec. 31 but its operating expenses increased \$109,168, or 18.2 per cent, and for the first three months of the present year the company has failed to earn operating expenses, to say nothing of its taxes and other fixed charges.

The new tariff proposes a return to the 5-cent unit of fare for all sections on the system except as to the lines along the shore from Plum Island to Hampton Beach. It is a combination of the present collection arrangement and the mileage zone plan which the management considers best adapted to its particular situation and business, and which it hopes will meet with public favor.

The plan in general is to establish 5-cent fare sections approximately 2½ miles in length except as to the mileage in cities and towns with relatively dense population where the sections and haul will be longer for the single fare.

About midway between the 5-cent limits or collection points, 2½-cent fare points will be established, to which a passenger may ride upon a 2½-cent check or ticket when used in connection with one or more 5-cent fares or tickets, so that one full fare section and one-half of the next adjoining section can be traversed for 7½ cents or two and one-half sections for 12½ cents, and so on. It will still be necessary to collect at every 5-cent fare point at least when open cars are used, but instead of the passenger being required to pay 12 cents as at present, for a continuous ride in any part of two sections, it will be possible for him to cross a collection point on the payment of 7½ cents by the use of a ticket. These 7½-cent tickets will be placed on sale at points convenient for patrons, in blocks of ten for 75 cents.

Free transfers will be issued at various centers allowing passengers to ride limited distances on other lines of the company, and it is proposed to continue the sale of workmen's tickets good in certain specified hours, and in certain specified sections at 75 per cent of the full tariff rate.

The establishment of the short, or intermediate, zones will automatically eliminate many so-called "lap overs" where passengers are now being carried beyond a regular fare point without additional charge, and except as

to the elasticity necessary to adjust a fare point to some local condition calling for special consideration, and for the longer sections in the more populous areas, the intention is as nearly as possible to charge on a mileage basis, and by the introduction of new zones on various routes as indicated in the tariff to equalize distances and remove any discrimination that exists at present.

## Filling the Market Basket

### Interurban Road Aids Its Employees to Purchase Supplies of Foodstuffs at Wholesale Prices

The Missouri Short Line, Kansas City, Mo., since Feb. 1 has been operating a system of supplying its employees with several items of groceries at practically wholesale cost. The principal foodstuffs distributed thus are potatoes, meat, sugar, bacon and canned goods.

An arrangement was made with a jobbing house for the purchase of groceries and meats ordered by the men. Each week a list of items with their prices is posted at the main office, at the carhouse in North Kansas City, and in St. Joseph. The men make up their orders in consultation with their wives and bring baskets to the carhouses in North Kansas City where the groceries are delivered on one of the company's freight cars.

### SAVING 25 TO 35 PER CENT

Orders are received and goods delivered every two weeks a few days before the semi-monthly pay day. The men are permitted to sign an order which, when passed by the head of the workmen's department, is received and charged against the amount the man has coming to him in the form of pay. The train dispatcher in North Kansas City occupies the day when deliveries are made in keeping track of them. His time is charged against the goods and the cost is distributed among the purchasers. The men save from 25 to 35 per cent on the cost of their groceries. In addition they do not have to run a grocer's bill and always get good quality and full value, even disregarding the discount they receive. More than one man has declared that the facilities thus provided are equivalent to a raise of \$10 a month. For some time trainmen have been in the habit of buying butter and eggs from farmers along the route who patronize the Missouri Short Line.

J. R. Harrington, vice-president and general manager of the Missouri Short Line, is pleased with the reception of the plan by the men. The supplies for the men are procured from a wholesaler in Kansas City, Kan., who does not deal with any of the merchants along the railway. Even those local merchants who might feel that they had cause to be aggrieved at such an arrangement, apparently do not take the matter as having any personal application to themselves.

## London Applies for Higher Fares

### Canadian Company is Conducting Publicity Campaign—Public Co-operation is Being Created

The London (Ont.) Street Railway has appealed to the City Council for an amendment to its franchise (granted March 8, 1895) permitting it to charge increased fares. The company does not specify the increase desired, but asks the Council to conduct an investigation to determine what increase is required.

The present fares of this Canadian company are as follows: workmen's tickets, nine for 25 cents; regular tickets, seven for 25 cents; children's tickets, two for 5 cents; children's cash fare, 3 cents, and regular cash fare, 5 cents.

In connection with its application, the company is conducting an aggressive publicity campaign, under the direction of Glenn Marston, New York. This is designed to acquaint the public with the problems the company has to solve, and show why the increase in fares is essential to the maintenance of good service.

The campaign has been under way for several weeks. Daily advertisements, such as those reproduced herewith, have been published in each city newspaper, comparing the company's increased cost of living with that experienced by every individual in the city. The papers have shown considerable interest in the question and each day interview officials of the company

The company publishes a four-page bulletin, entitled *Street Railway Service*, which normally appears twice a month. Publication is now weekly and will continue to be so during the discussion of the fare question. Distribution of the bulletin is secured through "Take One" boxes placed at convenient points in the car.

Regular-sized street-car cards are used generally for the company's safety slogans. The safety cards have been replaced by cards reading "Higher Fares? Read the Ads in the Papers."

### TWO SLOGANS ARE USED

Two standard slogans are used in the advertisements. The first one, "Let us have facts and fairness," has been referred to in nearly every communication sent to the papers. It has had the desired effect of keeping hysteria and plain "knocking" out of the discussion.

The second slogan, "What would you do if you owned the street railway?" is an effort to get the public to consider the problem from a personal point of view. It seems to be serving its purpose admirably, as is indicated by the public correspondence in the newspapers. Practically all the letters written to the papers contain suggestions which, in the eyes of the writers at

*Let Us Have Facts and Fairness.*

### SHOULD AN AGREEMENT BE MODIFIED?

This company is operating under an agreement made with the city in 1895. At that time it was considered a good agreement, and in the interest of both the city and the company.

But times have changed. There was no expectation that a time of extraordinary high prices would come.

If changing conditions have made any feature of that 1895 agreement harmful to the company, that same feature is harmful to the city.

It can now be seen that there should have been some provision in the 1895 agreement for changing conditions; but existence of that agreement does not prevent the city and the company from coming to a new agreement which will be more beneficial and satisfactory to both.

There is only one way for the company to give, and the city to get, the best service, and that is by co-operation. February 22, 1918.

**What would YOU do if you owned the Street Railway?**

LONDON STREET RAILWAY COMPANY,  
C. B. KING, Manager.

February 21, 1918.

*Let Us Have Facts and Fairness.*

### EGGS

Yesterday we spoke of the price of eggs in connection with street car fares. We showed that street car fares have not changed since 1895, but that the people have bigger and better cars, and that they can ride much further than they could in 1895.

We also showed that the cost of operating the street railway has increased tremendously, while the method of securing eggs has not changed at all.

Why, then, are we willing to pay eight times as much for an egg, which has not improved either in size or quality during the last 23 years? Would it not be fair also to pay more for street car rides, which are both longer and more comfortable than they used to be, especially since the cost of furnishing those rides has advanced amazingly?

**What would YOU do if YOU owned the Street Railway?**

LONDON STREET RAILWAY COMPANY,  
C. B. KING, Manager.

March 2, 1918.

### SPECIMENS OF ADS USED IN LONDON CAMPAIGN

in regard to points which are brought up in street discussion.

A large number of letters dealing with the fare question have been written to the papers and published by them. An interesting feature of these letters is the fact that only one of them has stated that fares should not be increased. Nearly all of the writers appear to recognize the necessity of the increase and are willing it should go into effect provided some pet hobby of the individual is inserted in the contract for the increase.

least, are constructive—a clear indication that the people are giving their electric railway problem real consideration.

Aside from its direct effect on the fare situation, the publicity campaign has already developed a feeling among the people that the interests of the public are best served by looking to the interests of the company. There exists a spirit of co-operation which was largely lacking before the railway took the patrons of the company into its confidence.

## Skip Stops for Pittsburgh

Commission Orders Their Installation—660 Ft. the Average Distance—Stops to be Marked by Signs

In an order issued on April 11 the Public Service Commission of Pennsylvania instructed the Pittsburgh Railways to install skip stops on three of its routes. The order says in part:

"The investigation of the operation of the lines on the Penn Avenue-Butler Street throat shows that the delays and congestion are partly due to the practice of having stops at or in nearly every block. The study of the traffic shows that a number of these stops can be eliminated without interfering to any degree with the convenience of the public and that this elimination will be likely to add to the regularity and speed of the service. The commission will, therefore, order the company to install stops in accordance with the schedule as set out in the order of the commission, which provides for about eight stops per mile, corresponding to 660 ft. between stops, substantially in accordance with the latest and best recognized street railway practice for large cities and in keeping with the contemplated order of the United States fuel administrator, reading as follows:

"*Bulletin No. 11, Electric Service Applied to Fuel Conservation*"

"The regular passenger stopping places for electric railways should be spaced so as not to exceed eight per mile in urban districts and six per mile in suburban districts. On interurban lines the regular passenger stopping places shall not exceed four per mile. Where safety stops are necessary they shall, so far as practicable, be combined with the passenger stops."

"Furthermore, good practice dictates that the stopping places shall be clearly defined by suitable signs. The railway company will be ordered to erect signs in advance at the proposed stopping places so that the public may be thoroughly informed as to the changes to be made in the operation."

Later in its report the commission states that these stopping signs shall consist of a circular disk with white background upon which is to be painted in black the words "Car Stop" and which, with its attachments, is to be suspended from the trolley wire at and over the place where the car stops.

## Zone Fares in Rhode Island May 1

The zone system will go into effect on the lines of the Rhode Island Company on May 1, the Legislature having authorized the company to establish this plan under the control of the Public Utilities Commission.

A. E. Potter, general manager, states that a ticket system will be used on the suburban and interurban lines. When a passenger pays his fare he will state his destination, and pay full fare there-to, receiving a ticket properly punched by the conductor.

This system is to be used on the following lines: Providence-Button-

wods, Providence-East Greenwich, Providence-Narragansett Pier, Providence-Riverpoint, Riverpoint-Rocky Point, Providence-Danielson, Providence-Chepachet, Providence-Woonsocket, Pascoag-Woonsocket, Pawtucket-Cumberland Hill, Pawtucket-Crescent Park, Providence-Riverside, and the Warren and Bristol.

On the lines where the fare is less than 10 cents, some other system is to be used. Just what that system will be has not been decided.

## Basis of Hartford Fare Appeal

City Cites Wherein It Believes Commission Erred in Recent Six-Cent Case

The appeal of the city of Hartford, Conn., from the decision of the Public Service Commission of Connecticut in sustaining the 6-cent fare on the lines of the Connecticut Company is returnable to the Superior Court at Hartford on May 7.

In the reasons given for the appeal the corporation counsel of the city states that the commission erred in finding facts relating to the price paid by the Consolidated Railway and the New York, New Haven & Hartford Railroad for street railway properties; in finding facts concerning prices that were contrary to evidence; in treating the Connecticut Company as a unit for the purpose of determining whether or not the 6-cent fare was reasonable; that the commission erred in finding that the 6-cent fare was reasonable in Hartford when admittedly certain of the railway lines within the city limits could be operated profitably on a 5-cent basis and when, so far as appeared from evidence, all the lines within the limits of the city could be operated at a profit on a 5-cent unit of fare.

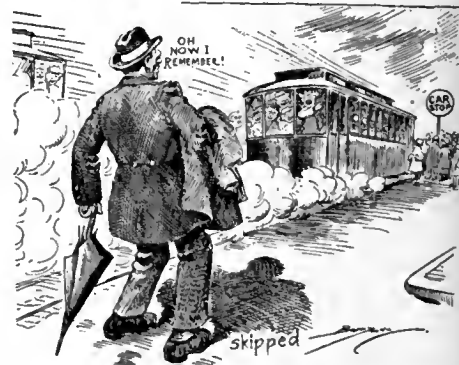
It is held that no data were submitted showing receipts from operations of lines in the carriage of passengers in Hartford; that the 6-cent fare is not a solution of the difficulties of the Connecticut Company; that there were no facts before the commission to determine whether the Hartford lines were operated at a profit or otherwise; that the commission erred in failing to require the Connecticut Company to rearrange its zone system with a view to fairness to all classes; that an error was made by the commission in ruling that the 6-cent fare was reasonable at a minimum fare for the short rider; that the commission erred in considering the property of the Connecticut Company as a whole notwithstanding the fact that it leases lines from the Connecticut Railway & Lighting Company and from the Shore Line Electric Railway.

The testimony presented before the commission in this case was reviewed at length in the *ELECTRIC RAILWAY JOURNAL*, and the decision of the commission was abstracted in the issue of this paper for March 30, page 620.

## Skip Stops in Washington

Smooth Inauguration of Plan in National Capital—Federal Trade Commission Staggers Hours

The skip-stop plan for the city of Washington, D. C., as proposed by John A. Beeler, was put into practice on April 21. The public was thoroughly informed through the newspapers that the change was to be made and that cars would stop only at the "car stop" signs. These are circular signs painted yellow, with "Car Stop" in black letters. In some cases they are carried on the trolley poles either in the middle or at the side of the street, and in other places



Skip Stops according to Washington Star

on an iron post about 6 ft. high. A saving in running time of 15 per cent is expected.

The *Washington Evening Star* for April 21 had a good humored cartoon, reproduced herewith, on the working of the new plan. The *Washington Times* described the inauguration as follows:

"There were some kicks because of the confusion in locating car stops; some complaints over the locations; the inevitable grouches that go with changes of any kind; but on the whole reports from the public appeared to indicate that the people, who are adjusting themselves to all sorts of overturning in their lives, regarded the skip-stop plan as about the best thing they have had imposed on them."

"The greatest satisfaction was over the saving of running time. The schedule on every line in the city has been shortened, and motormen and conductors like the change so well that they put 'pep' into their work, and there was acceleration in every direction. Motormen at last found opportunity to pull throttles wide open and make some real time, and they did it with a vim. The conductors entered into the spirit of it and even the passengers stepped more lively than usual in getting on and off the cars."

The Public Utility Commission will now probably soon take up the proposed plan of staggered hours for the different government bureaus and departments. The Federal Trade Commission has already begun this reform by voluntarily changing its opening hours from 9 a. m. to 8:30. It has 400 workers.



Transportation  
News Notes

**Kansas City Hearing April 29.**—The hearing on the application of the Kansas City Railways for an increase in fares has been set by the Public Service Commission of Missouri for April 29.

**Skip-Stop Plan at Dayton Will Be Retained.**—The City Commission at Dayton, Ohio, has decided that the skip-stop plan adopted by the street railways shall be retained as a means of conserving fuel.

**Six-Cent Fare Wanted in Taylorville.**—The Central Illinois Public Service Company, Mattoon, Ill., has applied to the Public Utilities Commission of Illinois for a 6-cent fare in Taylorville and for the elimination of commutation books.

**Final Milwaukee Hearing Begun.**—The final hearing was begun on April 8 on the application of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., to the Railroad Commission of that State for the readjustment of its fares covering the entire system in Milwaukee County.

**Higher Fares Indicated for Suburban Line.**—The March statement of the Columbus Railway, Power & Light Company, Columbus, Ohio, indicates that the fare on its Westerville line will have to be increased. The working capital of \$25,000, which is the fare indicator, has dropped to about \$15,000.

**West Penn Will Charge Six Cents.**—The West Penn Railways, Pittsburgh, Pa., has filed with the Public Service Commission a revised tariff schedule, in which it is proposed to increase fares from 5 to 6 cents. The new tariff will become effective on May 11. The company operates 339 miles of line.

**Operation of Trailers Suggested.**—The Administrative Board at Richmond, Va., has written to Thomas S. Wheelwright, president of the Virginia Railway & Power Company, requesting that trailers be added to all cars of the company during the hours when the congestion is greatest.

**Hearing on South Bend Rates April 26.**—April 26 was set as the date for the hearing before the Public Service Commission of Indiana at Indianapolis, Ind., on the application of the Chicago, South Bend & Northern Indiana Railway for permission to increase its inter-urban rates from 2 cents a mile to 2½ cents.

**Agree on East Cleveland Fares.**—The Cleveland (Ohio) Railway and the officials of East Cleveland have agreed upon a rate of fare of 5 cents, with the payment of 1 cent for transfers, for service between Cleveland and East Cleveland. It is believed the managers of the city will accept the franchise.

The grant will then have to be submitted to a vote of the electors.

**Increase in Fare Wanted in Battle Creek.**—The Michigan Railway has filed a petition with the City Commission of Battle Creek, Mich., for an increase of cash fares to 6 cents and the abolishment of the six-for-a-quarter tickets. The company has recently been authorized to charge a 6-cent fare in Jackson. This authorization was noted in the ELECTRIC RAILWAY JOURNAL of April 20, page 787.

**Six-for-a-Quarter Tickets Go.**—The Charlottesville & Albemarle Railway, Charlottesville, Va., April 16 was authorized by the State Corporation Commission to eliminate the six-for-a-quarter tickets and raise the labor and school pupil tickets from 2½ to 3 cents. The Council of the city of Charlottesville raised no objection and admitted the jurisdiction of the Corporation Commission.

**New Sunday, Holiday and Excursion Fares.**—The Southern New York Power & Railway Corporation, operating from Mohawk to Oneonta through Richfield Springs and Cooperstown, has filed with the Public Service Commission of the Second District of New York a new tariff schedule, effective on May 30 and continuing in effect until Oct. 1, 1918. The new tariff affects special Sunday, holiday and week-end excursion fares between various local stations for the season of 1918.

**Omaha Feels the Pinch.**—In announcing the increase in the pay of its employees referred to elsewhere in this issue of the ELECTRIC RAILWAY JOURNAL the Omaha & Council Bluffs Street Railway, Omaha, Neb., issued a statement in which it said: "From the total increases of wages to our men during the last two years, together with the increased cost of every article purchased by the railway, it may be seen that prompt relief must be sought either in an increase of fares, or in other directions, in order to enable the company to meet its financial obligations."

**Short Colorado Road to Increase Fares.**—The Denver & South Platte Railway, operating 5 miles of road between Denver and Littleton, has made application to the Public Utilities Commission of Colorado for an increase in fare from 5 cents to 10 cents between Englewood and Littleton. Commutation books containing twenty-five fares are to be sold for \$1.50, thus reducing the cost per ride to 6 cents. Under the new arrangement the fare from Denver to Littleton will be 11 cents, if the commutation plan is used. The new rates will go into effect on May 10 unless protest against them is entered with the commission.

**Portland Fare Appeal Filed.**—The city of Portland, Ore., on April 5 filed in the Supreme Court its appeal in the 6-cent fare case, in which the city is appellant and the State Public Service Commission respondent. The case involves the question of the jurisdiction

of the commission, as the result of an order allowing the Portland Railway, Light & Power Company to increase its fares from 5 cents to 6 cents. The commission won the unanimous decision of the six judges in the lower court. Appeal was filed through W. P. La Roche, city attorney. A hearing will not be held on the Portland appeal until the Supreme Court returns from Pendleton, where the Eastern Oregon session will be held the first week of May.

**Protests Johnstown Increase.**—City Solicitor Tillman K. Saylor, acting for members of the Council of Johnstown, Pa., and the citizens' protest committee, has filed with the Public Service Commission a complaint against the new tariff of the Johnstown Traction Company. Mr. Saylor says that 5-cent fares "yield ample return on the capital invested, if the business of the company is properly managed," and asserts that the proposed 6-cent rate is "excessive, unjust and unreasonable." It is further alleged that the company has failed to extend its lines and improve its service as demanded by the transportation needs of the community. The new tariff went into effect on April 14.

**Application to Dismiss Refused.**—A decision has been rendered by the Public Utilities Commission of Maine overruling the motion of Guy H. Sturgis, attorney general, to dismiss the application of the Cumberland County Power & Light Company for an increase in its passenger fares to 6 cents on electric roads in Portland and vicinity. The effect of this ruling is to require the remonstrants, represented by the attorney general, to prepare and submit their case. The preparation would necessitate the testimony of an engineer for valuation purposes, the reasonableness of the creation of central and outside zones, the matter of not charging for transfers and the curtailment of service. In March the commission suspended the proposed rates until June 7 in order to allow the protestants to examine the company's evidence and employ experts.

**Increase in Evansville Fare Approved.**—The Public Service Commission of Indiana has granted the petition of the Public Utilities Company, Evansville, Ind., for the elimination of ticket fares, and has authorized the company to charge a straight 5-cent cash fare, with the usual transfer privileges, and to suspend the sale of tickets at the rate of six for 25 cents until the further order of the commission, but not exceeding a period of two years. The investigation of the commission showed that the company was confronted with a deficit estimated at \$35,000 for the year 1918, and that the relief asked would only meet a part of the added costs of operation. It was assumed by the commission that with a normal increase of traffic, the establishing of a straight 5-cent fare would yield an increased revenue of \$45,000 for the year, which, however, it was estimated would not meet more than 50 per cent of the increased cost of operation.



## Legal Notes

### ILLINOIS.—*Payment to Parent Does Not Satisfy Judgment in Favor of Child.*

A father has no right by reason of the parental relation to the custody of the estate of his minor child. Hence, a payment to the father of a judgment rendered in favor of the infant does not satisfy the judgment. (*Paskewie vs. East St. Louis & Suburban Ry.*, 117 N. E. Rep., 1035.)

### KENTUCKY.—*Better Terminal Facilities, Made Necessary by Modern Conditions, Do Not Require Additional Franchise.*

Where a single spur track was put in when horsepower was used by a street railway before the adoption of the present Constitution requiring franchises upon public streets to be sold to the highest bidder, a subsequent consent by the city to a double spur track with a loop, necessary on account of the substitution of motor power, was not the grant of an additional franchise, but the conforming of an old turnout to modern conditions, to which the street railway possesses a property right. (*City of Dayton et al. vs. South Covington & Cincinnati St. Ry.*, 197 S.W., 670.)

### KENTUCKY.—*Assessment Against Electric Railway for Oiling Street Is Valid.*

The oiling of city streets being a permanent improvement, preserving and making the streets more lasting for the purpose of travel, a reasonable part of the cost thereof may be assessed against an electric railway using such streets. (*Henderson Trac. Co. vs. City of Henderson*, 198 S.W. Rep., 730.)

### MASSACHUSETTS.—*Injury to Person Who Climbed Over Barrier Across Street Under Repair.*

Where barriers erected by a city indicated that a street had been temporarily withdrawn from public travel by reason of repairs, a street railway company is not bound to anticipate the presence of pedestrians on such street, or that they will stumble over such paving and fall in front of a car. (*Conners vs. Worcester Consol. St. Ry. Co.*, 117 N. E. Rep., 334.)

### MASSACHUSETTS.—*Falling Window Not Necessarily Caused by Negligence of Company.*

In an action against a street railway for injuries when an open window of its car fell on a passenger's arm, evidence held insufficient to show that the window was raised and improperly fastened in place by a servant of the street railway and not by some person for whose act it would not be responsible. (*Murphy vs. Boston El. Ry.*, 118 N. E. Rep., 191.)

### MASSACHUSETTS.—*Commission Has Power to Change Rates Specified in Original Grant.*

Whether the Bay State Street Railway should be permitted to withdraw six-for-25-cents commutation tickets over the Slade's Ferry Bridge at Fall River, issuance of which was made a condition by the city of Fall River to the grant of a location to the road's predecessor, was a question to be decided according to the judgment of the Public Service Commission, based on the evidence of the company's financial condition and ability to serve efficiently the public, dependent on the maintenance of its entire system. (*City of Fall River et al. vs. Public Service Commission et al.*; *Same vs. Bay State St. Ry. Co.*, 117 N.E. Rep., 915.)

### NEW JERSEY.—*Township Cannot Compel Construction of Part of Line if Legal Obstacles Prevent Its Construction Complete.*

A municipal ordinance authorized the construction of a street railroad from terminus to terminus but the company found it would be unable to obtain the permission of a steam railroad to cross its tracks. Held that the township authorities could not demand from the court a mandamus to compel the construction of the road in two unconnected sections, separated by the steam railroad in question. (*Hamilton Township vs. Mercer County Trac. Co. et al.*, 102 At. Rep., 3.)

### NEW JERSEY.—*Municipalities Enjoined From Moving Turnout.*

Municipal corporations are not, as respects public rights, within statutes of limitations, but in exceptional cases the court may hold the public estopped, if right and justice require.

A street railway company, acting under ordinance in constructing its railroad, changed the location of one of its turnouts from the point designated in its authority to another point a considerable distance away, where, however, its location could have been authorized originally. The railroad and turnout, thus constructed, were maintained and operated for twelve years without any protest from the municipalities, or the landowner in front of whose property the turnout was constructed. Held, that the municipalities, both of which ordered the removal of the turnout, be perpetually enjoined from removing it. (*Trenton & Mercer County Trac. Corp. et al. vs. Inhabitants of Ewing Township et al.*, 101 At. Rep., 1037.)

### NEW YORK.—*Rights at Crossings Defined.*

"At crossings, neither the street car nor the pedestrian has a paramount right of way. Between crossings the car has the right of way." (*Goldstein et al. vs. Union Ry.*, 167 N. Y. Sup., 837.)

### NEW YORK.—*Persons Liable for Damage from Charged Telephone Wire.*

Where a railway company, maintaining a telephone wire, knew that the heavily charged wire of a light and gas company had sagged upon the telephone wire, the railway company and

the light and gas company were in pari delicto as to the killing of a third person's horse by coming in contact with electricity from the railway company's telephone wire, which burned in two and fell to the ground. (*Hudson Valley Ry. Co. vs. Mechanicville Elec. Lt. & Gas Co.*, 166 N. Y. Sup., 816.)

### PENNSYLVANIA.—*Paving of an Improved Kind Required.*

An ordinance granted a street railway company the right to use the streets as a right-of-way provided that it should be required at the time of the construction of the railway to pave the streets between its tracks and for a distance of 24 in. outside of each rail with material or pavement similar to that then in use or which might in the future be used or adopted by the municipality, and keep and maintain the same in good condition, so that driving on, off, or across the tracks should be safe. At the time of construction of the road the municipality's streets were macadamized, and defendant macadamized the streets between its tracks. Thereafter the municipality ordered repaving of certain streets with vitrified brick, and defendant thereupon paved its portion of such streets with the same material. Subsequently the municipality ordered the paving of other streets with vitrified brick and notified defendant to pave its portion. Defendant refused, on account of its financial condition. Held that, as the streets were in need of construction and repair, specific performance of the contract was properly directed. (*Chambersburg Borough vs. Chambersburg & Gettysburg Elec. Ry.*, 101 At. Rep., 922.)

## New Publications

### Coal: The Resources and Its Full Utilization

By Chester C. Gilbert and Joseph E. Pogue of the Division of Mineral Technology, United States National Museum. Paper, twenty-six pages.

This is a reprint of Part 4 of Bulletin 102 of the United States National Museum, Smithsonian Institution.

### The Employment Department and Employee Relations

By F. G. Henderschott and F. E. Weagly. The LaSalle Extension University, Chicago, Ill. Paper, sixty pages.

This pamphlet describes the organization and the duties of an employment department, the functions of the employment manager, his relation to other departments, the sources of labor supply and the scientific method of selecting men for jobs. Practical questions of transfers, promotion and general welfare are also discussed. The pamphlet is a good guide to the modern handling of employment problems.

## Personal Mention

Charles H. Session has been named a member of the Public Utilities Commission of Kansas.

Arthur McGee has been appointed master mechanic of the Indiana Railways & Light Company, Kokomo, Ind., to succeed I. H. Montgomery.

Walter Harris has resigned as master mechanic of the Central California Traction Company to accept the position of master mechanic with the Portland, Eugene & Eastern Railway, Portland, Ore.

Charles R. Detrick, secretary of the California Railroad Commission, has resigned. Rudolph A. Pabst, who has been assistant secretary for some time, will perform the duties of secretary for the present.

H. S. Murphy has been appointed engineer of distribution of the Philadelphia (Pa.) Rapid Transit Company to succeed J. H. M. Andrews, who was called into service last August with the Pennsylvania National Guard.

George D. Powell has been promoted to the position of office engineer in the maintenance of way department of the Union Traction Company of Indiana, Indianapolis, Ind. Mr. Powell has been draughtsman in that department since last August.

E. C. Pfenning, secretary of the City Light & Traction Company, Sedalia, Mo., has been transferred to a similar position with the Montgomery Light & Water Power Company, Montgomery, Ala. Allen O'Bannon, general bookkeeper at Sedalia, succeeds Mr. Pfenning.

S. R. Humbert has been appointed superintendent of transportation of the Indiana Railways & Light Company, Kokomo, Ind., to succeed F. O. Pense, who has been appointed superintendent of the Oakland Coal Company, which has been formed to mine coal for the railway and light company.

Charles E. Cox, for the last fifteen years with the Urbana & Champaign Railway, Gas & Electric Company, (Illinois Traction System) Champaign, Ill., has resigned to give his entire attention to an automobile business in which he is interested. Mr. Cox has served as cashier, auditor and office manager for the local utility company in Champaign, Ill. He will continue to be located in that city.

A. G. Carson, former manager of the Eastern Wisconsin Electric Company at Fond du Lac, Wis., has been appointed assistant to the vice-president of the Wisconsin Public Service Company, Green Bay, Wis., and will for the present assume the duties performed previously by J. G. Miller at Manitowoc, Mr. Miller having been ordered to Baltimore as noted in this paper for April 20.

George A. Post has announced his intention to retire as president of the Railway Business Association. Mr. Post has been president of the association ever since its organization. The principal purpose of the association in the past has been to promote good relations between the railways and the railway supply companies and to educate public opinion and public officials regarding railway questions.

Ainslee A. Gray, formerly editor of *Electrical Review* and more recently in the advertising business in Chicago, has been commissioned major in the ordnance department of the United States Army. Major Gray will establish a bureau to supply information to ordnance manufacturers and their employees through the trade press, the government believing it desirable to keep in touch with manufacturers in this manner.

Rollo Keesler has been appointed division engineer for the Anderson division of the Union Traction Company of Indiana, Indianapolis, Ind., to succeed Bob Custer. Mr. Keesler has been office engineer in the maintenance of way department of the company since 1912, except for a few months' absence. Prior to becoming connected with the Union Traction Company he was for two years with the National Tile Works and for two years with the American Steel & Wire Company as draftsman.

George Alan Green, chief engineer and superintendent of the Fifth Avenue Coach Company, New York, N. Y., has been made a major in the British Tank Corps now in active service in France. He left the coach company last spring to become a captain in the Tank Corps, and has in the last year participated in practically every tank "show" on the western front, including the Cambrai attack. Major Green returned to the front last month after a short furlough, during which he visited New York.

C. Nesbitt Duffy, vice-president and general manager of the Manila Electric Railway & Light Company, Manila, P. I., and also president of the Manila Merchants' Association, recently presided at a reception given in Manila in honor of Paul S. Reinsch, United States minister to China. In addition to the duties called for by these two offices, Mr. Duffy is also president of the Friendly Sons of St. Patrick in Manila, and at the annual banquet of that society on March 17, 1918, introduced several novel features. One of these was that none of the banqueters knew who the speakers would be until they were presented by the toastmaster. This added to the interest of the occasion.

A. R. Piper, general freight agent of the Brooklyn (N. Y.) Rapid Transit Company, has been appointed lieutenant-colonel of the Quartermaster's

Corps of the National Army and depot quartermaster in command of the New York depot, being advanced from the rank of captain, with which, in April, 1917, he was called back into active service by the President, and skipping entirely the intermediate rank of major. Colonel Piper was born at Fort Wadsworth, Staten Island, in 1865. He was graduated from West Point and served ten years in the regular army. He retired from active service in June, 1899, and since then has been employed in civil pursuits until recalled into the army. In March, 1904, he became general superintendent of the American Railway Traffic Company, a subsidiary of the Brooklyn Rapid Transit System, and subsequently general freight agent of the South Brooklyn Railway.

Lewis A. Armistead, an assistant to M. C. Brush, president of the Boston (Mass.) Elevated Railway, has been commissioned a first lieutenant in the officers' reserve of the Engineer Corps, U. S. A., and detailed to a regiment now being recruited to operate the military railways in France. Mr. Armistead has been in the company's service more than twenty years, for the past few years also having been assistant to the vice-president and to the chief of maintenance. A great grandson of Daniel Webster and a grandson of Gen. L. A. Armistead, who was killed in Pickett's charge at Gettysburg, Lieutenant Armistead personally saw service as a private in the Sixth Massachusetts infantry during the Spanish war, and was in action at Guanita, Porto Rico. He has been actively identified with the operation of the rapid transit and surface lines of the Boston company since the beginning of the present co-ordinated service.

Edmund G. Simons, assistant transit commissioner of Pittsburgh, Pa., has been called into active service as first lieutenant in the Engineer Reserve Corps. Mr. Simons was graduated from Union College, Schenectady, N. Y., in 1905. He has had experienced which fits him particularly well for this type of service. Approximately eleven out of the thirteen years since he left college have been spent on construction work as follows: One year ship canal construction, one year general contracting, two years sub-aqueous tunnels, four years steam and hydroelectric power station building and three years railroad construction in China. The remaining two years have been spent on studies for the relief of transit problems in Chicago and Pittsburgh.

Morse W. Rew has resigned as chief engineer of the Pittsburgh Transit Commission to become an assistant to A. M. Taylor, who is in charge of the division of passenger transportation of the Emergency Fleet Corporation. Mr. Rew was graduated from Grinnell College, Iowa, and from the Massachusetts Institute of Technology in the class of 1909. After completing his course at the latter he remained two years as an instructor in civil engineering. Following this he held a position as design-

ing engineer in the department of bridges, and in the port director's and Transit Commission's office in the city of Boston. From Boston Mr. Rew went to Cincinnati as designing engineer for the Transit Commission there. Later he became principal assistant with the Cincinnati Commission, but resigned from that place in 1916 to become chief engineer of the Pittsburgh Transit Commission. Both in Cincinnati and Pittsburgh Mr. Rew supervised extensive traffic surveys and studies which fit him for the patriotic and important work that he is now to undertake in the interest of the government.

## Obituary

**Luther Kountze**, head of Kountze Brothers, prominent New York bankers, is dead. Mr. Kountze was formerly in business in Denver, Col., and is said to have been president of the first street railway built in that State.

**Edwin P. Seitz**, line foreman of the Mahoning & Shanango Railway & Light Company, Youngstown, Ohio, was fatally injured recently when he came into contact with high voltage wires while doing some switching at the Lowellville substation of the Sharon Steel Hloop Company. Four days after the accident Mr. Seitz died.

**Rufus Franklin Emery**, aged forty-eight, secretary and treasurer of the Westinghouse Air Brake Company, an officer and director of several other important corporations, died suddenly on April 11 while seated at his desk in his office at the Air Brake works in Wilmerding. Mr. Emery was born near Boston. He became affiliated with the various Westinghouse Company interests in 1891.

**Charles L. Wight**, former auditor of the Des Moines (Iowa) City Railway, died on April 4 in Dallas, Tex. Mr. Wight retired from active work several years ago and his illness continued over a period of about three years. In addition to his connection with the Des Moines City Railway, Mr. Wight had been identified with electric railway work in Toledo, Chicago and several other cities.

**Bernard Gallagher**, a director in many corporations and a retired building contractor, died in his eightieth year at his home in Brooklyn on April 19. Mr. Gallagher was president of the Brooklyn, Queens County & Suburban Railroad, and of the Metropolitan Engineering Company, and a director of the Brooklyn Heights Railroad, the Brooklyn Rapid Transit Company, the Edison Electric Illuminating Company of Brooklyn, the Kings County Electric Light & Power Company, the Manufacturers' Trust Company, the New York Consolidated Railway, the New York Municipal Railway and a number of other corporations.

# Construction News

## Recent Incorporations

**Chatham County Traction Company, Savannah, Ga.**—A charter has been granted to the Chatham County Traction Company for the construction of an electric line from a connection with the Savannah Electric Company's line at the intersection of Augusta Avenue with Lathrop Avenue, Savannah, to Port Wentworth, about 6 miles. Capital stock, \$150,000. The incorporators include H. C. Foss, secretary of the Savannah Electric Company; W. W. Osborne, A. A. Lawrence, David S. Atkinson and Edmund H. Abrahams, all of Savannah. [April 6, '18.]

**Wichita-Southern Interurban Railway, Wichita, Kan.**—Incorporated to construct a line from Wichita to Derby, Mulvane, Belle Point, Arkansas City, Winfield and other points. Capital stock, \$2,000,000. Incorporators: Schuyler Jones, David Alter, W. I. Funk and C. S. Drake, all of Wichita. [April 20, '18.]

## Franchises

**Mobile, Ala.**—The Mobile Light & Railroad Company will ask the City Commission for a franchise to construct a single track connecting with the track now on Charleston Street at the intersection of St. Emanuel Street, southwardly along St. Emanuel Street to Texas Street and westwardly on Texas Street to connect with the line on Cedar Street, in order to provide the workers now employed in the ship-building plants in the southern part of the city with better street car facilities.

**Covington, Ky.**—The Cincinnati, Newport & Covington Railway now holds a perpetual franchise over all Covington streets that its line traverses, except those of the old town of Latonia. The decision of the United States Supreme Court in this case is referred to elsewhere in this issue.

**New York, N. Y.**—Officials of the New York & Queens County Railway are considering the proposition of applying to the Board of Estimate for a franchise to construct an extension from the Shell Road through Roosevelt Avenue to connect with the Alburtis Avenue station of the Corona elevated line. This application for a franchise will supersede the application now before the board for a permit to build an extension of the company's lines from Kingsland Avenue to the Alburtis Avenue station.

## Track and Roadway

**Pacific Electric Railway, Los Angeles, Cal.**—A new line is being built by the Pacific Electric Railway from the mouth of Quarry Canyon to the mouth of San Dimas Canyon, about 1 mile.

**Woodstock & Sycamore Traction Company, Genoa, Ill.**—Operation has been abandoned on the line of the Woodstock & Sycamore Traction Company between Sycamore and Marengo, and the rails, ties and equipment are being sold as junk.

**Chicago, Lake Shore & South Bend Railway, Michigan City, Ind.**—It is reported that the Chicago, Lake Shore & South Bend Railway will extend its lines in Indiana Harbor to that section of the city north of the canal.

**Fort Madison, Ia.**—Preparations will soon be made for the construction of the proposed line from Fort Madison to Nauvoo. C. W. Petsch, St. Paul, Minn., is the promoter of the line. [Aug. 12, '16.]

**St. Louis & Illinois Railway, St. Louis, Mo.**—Installation of trolley wires and additional tracks to permit the operation of street cars on the Free Bridge before June will commence in a couple of weeks, is the announcement made by Director of Public Utilities Hooke, following the issuance of a permit to the St. Louis & Illinois Railway. Two one-man cars will be placed in service at first on a fifteen-minute schedule. Other cars will be added as they are required. The permit obliges the company to build twelve blocks of tracks in East St. Louis within six months, and to use the interurban loop in St. Louis within thirty days after its completion. [March 16, '18.]

**Public Service Railway, Newark, N. J.**—The Public Service Railway, on account of the United States Shipping Board for the Emergency Fleet Corporation, will erect two pay-as-you-enter terminals and loops at the South Camden and Gloucester shipyards, which will provide loading space for ten cars and storage accommodations for thirty cars. The cost of the work will be defrayed by the government.

**Trenton, N. J.**—The City Commission of Trenton is seeking the aid of the federal government in the plan to equip a direct trolley system between Trenton and Tullytown and Bristol, Pa., to the center district of Trenton, which co-operation is made possible through the enactment of recent legislation by Congress. The City Commission wants the New Jersey & Pennsylvania Joint Bridge Commission to grant a fran-

chise to the Trenton, Bristol & Philadelphia Street Railway to lay a system of trackage over the lower Delaware River bridge in South Trenton in the event of the federal government lending its approbation to the projected plan.

**Interborough Rapid Transit Company, New York, N. Y.**—The Public Service Commission for the First District recently received bids for the installation of tracks, including the furnishing of part of the track materials for the extension of the Interborough subway in Flatbush Avenue and Eastern Parkway, Brooklyn, and for the Nostrand Avenue branch of the same line. The contract also provides that if the government agrees to release the necessary steel for the construction of Route No. 31—the Livonia Avenue elevated extension of the Eastern Parkway line—so that the track installation there may be begun by the time the work in Flatbush Avenue, Eastern Parkway and Nostrand Avenue and also on the so-called Brighton Beach connection is completed, that work will be included. The Brighton Beach connection, so-called, begins at Malbone Street and the present Brighton Beach line in Brooklyn and extends as a subway under Flatbush Avenue contiguous to the Interborough subway and thence under the Flatbush Avenue station of the Long Island Railroad and under St. Felix Street and Fulton Street to a connection with the Fourth Avenue subway. It is believed that the Brighton Beach line and the Eastern Parkway line will be ready for operation by or about the end of the year and the Nostrand Avenue line a short time later. The lowest bid received was from Holbrook, Cabot & Rollins Corporation and George W. McNulty, New York, at \$600,569. A tabulation of the recent bids received by the commission for the construction of Route 49, Section 3, the last section of the Culver line in Brooklyn, showed the lowest bidder to be the Bethlehem Steel Bridge Corporation, whose total bid based on alternative contract forms were for one type \$432,100, for another type \$419,020, and for a third type \$427,860.

**New York & Queens County Railway, New York, N. Y.**—Justice Van Sicken has denied the petition of the New York & Queens County Railway which asked for a suspension until after the war of the mandamus order compelling it to extend its Flushing Avenue line in Astoria from Ehret Avenue to Jackson Avenue, Corona. The work was to begin on April 1 and be completed by Aug. 31 this year.

**Guelph (Ont.) Radial Railway.**—A report from the Guelph Radial Railway states that the company will place contracts within the next three months for the reconstruction of about 2000 ft. of track with Lorain 335-80-lb. T-rail, concrete construction.

**Hull (Que.) Electric Railway.**—This company proposes to construct 7000 ft. of new double track on Montcalm Street and Chelsea Road, Hull.

**Rhode Island Company, Providence, R. I.**—City Engineer Bronsdon has been requested by R. H. Flannery, Director of Housing for the United States Shipping Board, to submit estimates of the cost of extending the Rhode Island Company car line from Eddy Street through Ernest Street, across Allen's Avenue and on to the municipal dock at Field's Point, a distance of slightly more than a mile. It is practically assured that the federal government will finance the cost of the extension, as a convenience to the hundreds of employees who will soon be at work at the government boiler factory and at the ship outfitting plant of the Lord Construction Company there.

**Dallas (Tex.) Railway.**—The City Commission of Dallas has approved an application covering proposed improvements to be made by the Dallas Railway amounting to approximately \$500,000. This is part of the proposed expenditure of \$1,000,000 referred to elsewhere in this issue.

**Rutland Railway, Light & Power Company, Rutland, Vt.**—Announcement has been made by the Rutland Railway, Light & Power Company that, following out its general policy of conservation, it will discontinue its branch trolley line from Castleton Corners to Lake Bomoseen and will dismantle the road and remove the rails, part of which will be used in repair work and the balance sold.

**Seattle (Wash.) Municipal Street Railway.**—A proposal to extend the Seattle Municipal Street Railway from First Avenue South on Washington Street to Third and Fourth Avenues, with a spur on Third Avenue and a landing platform on Yesler Way, submitted by Councilman Oliver T. Erickson, chairman of the city utilities committee, is receiving serious consideration. The cost of the extension is estimated at about \$85,000. City Engineer Dimock recently announced that construction work on the line, which will extend to the shipyard district, will begin immediately and that, barring unforeseen delays in the arrival of the necessary materials or in the condemnation proceedings, will be ready for operation within six months. The line, according to present plans will extend from First Avenue South and Washington Street to the West Waterway, where it will connect with the Lake Burien line, known as Division C. In case the city utilities committee favors the proposal of Councilman Erickson, work on the elevated section from Fourth Avenue to First Avenue South on Washington Street will proceed apace with other construction proposed. The city engineering department has recommended to the Board of Public Works that the bid of D. W. Rutherford, of Tacoma, of \$42,262 for the construction of the trestle portion of the line from Holgate Street to Washington Street, be accepted. A call for bids for track and overhead construction will be made by the Board of Public Works in the near future.

## Shops and Buildings

**Connecticut Company, New Haven, Conn.**—Improvements will be made by the Connecticut Company to its freight house on Pratt Street, Meriden, which will greatly facilitate the handling by the company of incoming and outgoing shipments.

**Boston (Mass.) Elevated Railway.**—Within a few weeks the Boston Elevated Railway will open its new Everett terminal on Broadway opposite Thorndike and Washburn Streets. It is probable that most of the Everett and Malden cars will enter this terminal.

**Gulfport & Mississippi Coast Traction Company, Gulfport, Miss.**—A contract has been awarded to C. A. Thompson, Biloxi, by the Gulfport & Mississippi Coast Traction Company for the construction of a station at U. S. Naval Training Camp at a cost of \$3,000.

**Northern Ohio Traction & Light Company, Akron, Ohio.**—Work has been completed on the new terminal building of the Northern Ohio Traction & Light Company at Main and Federal Streets, Akron, which has been under construction for the past year. The company will move into its new quarters May 1.

**Lake Shore Electric Railway, Cleveland, Ohio.**—Fire recently partially destroyed the carhouse of the Lake Shore Electric Railway together with six coaches. The loss is estimated at \$50,000.

**Nipissing Central Railway, North Cobalt, Ont., Can.**—This company will construct an addition to its carhouse.

**Norfolk & Western Railway, Bluefield, W. Va.**—Plans are being made by the Norfolk & Western Railway to reconstruct its machine shop in Wilcoe which was recently destroyed by fire.

## Power Houses and Substations

**Selma (Ala.) Traction Company.**—It is reported that extensive improvements will be made by the Selma Traction Company to its power plant.

**Manchester Traction, Light & Power Company, Manchester, N. H.**—A contract has recently been awarded by the Manchester Traction, Light & Power Company for the construction of a power house and dam in the Greggs Falls district of Goffstown. French & Hubbard, Boston, are the engineers.

**Nova Scotia Tramways & Power Company, Halifax, N. S.**—It is reported that the Nova Scotia Tramways & Power Company contemplates the purchase of new cars, electric equipment and generating machinery.

**Choctaw Railway & Lighting Company, McAlester, Okla.**—It is reported that the Choctaw Railway & Lighting Company will construct an electric system in Hartshorne.



# Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

## G. E. Business Jumps

The Orders Received in 1917 Increased \$77,000,000 or 45 Per Cent—Sales Billed Rose \$62,000,000

In the calendar year 1917 the volume of business of the General Electric Co., Schenectady, N. Y., far exceeded that of any previous year. The value of orders received, compared with those of the preceding four years, was as follows:

	Electrical and Mechanical	War Munitions	Total
1917.....	\$246,778,491		\$246,778,491
1916.....	167,169,058	\$2,416,000	169,585,058
1915.....	98,385,891	33,980,000	132,365,891
1914.....	83,748,521		83,748,521
1913.....	111,819,142		111,819,142

A substantial portion of the large increase of \$77,193,493 or 45.5 per cent. for the last year consisted of orders for ship propulsion and other apparatus placed by and for the United States government; but the increase extended to nearly every line of the company's product. Higher prices were also a factor in the larger total value of orders.

The amount of sales billed in 1917, as shown in the accompanying statement, was \$196,926,317, an increase of \$62,684,027 or 47 per cent. The large increase in sales during the last two years has made it necessary to add to manufacturing facilities to an extent entirely without precedent. During the year \$22,320,895 was expended for land, buildings and other structures, tools, machinery and smaller equipment and fixtures. In view of the prevailing high prices of all material and other unusual conditions, the sum of \$13,287,249 was charged against income and general reserve as depreciation and additional plant reserves, resulting in a net increase, in the book value of plant and equipment, of \$9,033,645. Expenditures of \$13,000,000 for further plant extensions, to be completed in 1918, were authorized.

The large increase in the volume of orders naturally involved corresponding increases in merchandise inventories and in customers' notes and accounts receivable. After the deduction of reserves, the merchandise in factories, district warehouses and elsewhere has a net book value of \$81,851,310, an increase of \$30,690,671 for the year. Customers' notes and accounts receivable, after the deduction of reserves, are carried at a net book value of \$38,406,993, which is \$11,590,695 more than the balance outstanding at the close of 1916.

The additional capital absorbed in plant extensions, inventories and customers' accounts amounted to \$77,602,-

## INCOME STATEMENT OF GENERAL ELECTRIC COMPANY\* FOR CALENDAR YEAR, 1917

Net sales billed.....	\$196,926,317
Cost of sales billed, including all operating, maintenance and depreciation charges.....	167,921,777
	\$29,004,540
Interest and discount.....	\$1,433,317
Income from securities.....	2,661,150
Sundry revenue.....	417,822
	4,512,290
Net income.....	\$33,516,830
Interest on debentures.....	\$571,645
Interest and discount on notes payable.....	541,357
	1,113,002
Excess profits tax, estimated.....	\$32,403,828
	5,500,000
Profit available for dividends.....	\$26,903,828
Dividends on stock:	
8 per cent cash.....	\$8,120,648
1 per cent cash "Red Cross".....	1,015,078
2 per cent stock.....	2,030,156
	11,165,882
Net surplus for the year.....	\$15,737,946
Surplus, Jan. 1, 1917.....	34,160,753
Total surplus.....	\$49,898,699

262, in order to provide for which, in part, the company issued short term notes. The balance outstanding on Dec. 31 was \$27,757,721. It is expected that with the return of normal business conditions, sufficient cash will be released by a reduction in inventories and customers' notes and accounts to provide for two note issues aggregating \$25,000,000.

On Nov. 24, 1917, the board of directors declared, in addition to the regular cash dividend, a semi-annual dividend of 2 per cent, payable in stock at par. This action was taken in view of the large surplus from accumulated earnings covering a period of years, invested in manufacturing facilities, working capital and other assets, against which no stock had been issued. The directors preferred, rather than to increase the rate of cash dividends, to adopt the policy of paying semi-annual stock dividends at the rate of 4 per cent per annum, payable in January and July, in addition to the regular 8 per cent cash dividends.

The federal taxes for 1917, including the income tax at 6 per cent \$1,789,508, which was absorbed in cost of sales, and the estimated excess profits tax of \$5,500,000, will amount to \$7,289,508.

For a number of years it has been the practice of the directors to provide against contingencies by setting aside substantial reserves. An examination of these reserves has made it clear that a proportion of them is unlikely to be used for the purpose originally intended, and this amount, estimated at about \$12,000,000, has been set apart as a general reserve against all assets of the company other than its plant investment.

## Railway Material Deliveries

Embargoes Are Suspended at Times—Release Orders on Shipments Are Issued and Sought

Occasionally the freight embargoes lift or are suspended temporarily. When this occurs, and shippers and consignees of electric railway material are on the lookout, goods which have been awaiting such an opportunity slip through and reach their destination. Not always, however, without mishap. A carload of gears and pinions consigned to a New York City company came through on a release order last week under these circumstances. It had been urgently needed for some time, and every chance to get it through was eagerly watched. Generally speaking, deliveries on gears and pinions are easier, prices remaining unchanged.

Another shipment of gears and pinions from a Western point, consisting of four distinct orders, was placed in the same car. Somewhere en route the contents were transferred to another car and sent over another line. Of course, the transshipment was effected without ceremony, not to say without the slightest regard for the various invoices and their arrangement by the indifferent trainmen. On arrival in New York the consequences of such carelessness were apparent. Everything had been thrown into the car helter-skelter, and a general mix-up was the result. It took two days to straighten out the tangle. Shipments of splicing sleeves, trolley ears, high-tension porcelain insulators, frogs, cross-overs, headlights, couplers, rail bonds and tools, unless special, are being made out of stock. Delivery is from two to four weeks to all Eastern points, subject to the delays of existing embargoes. It is believed that the recent order of the War Industries Board, which places these items in Preference List No. 1 only when intended for concerns engaged directly or indirectly in the production of war material, will expedite shipments to those roads in which the government is especially interested as regards transportation of workmen engaged in government work. Prices remain steady and no increase is anticipated.

A recent order of the Public Service Commission for the First District of New York for the discontinuance of turnstiles on the Brooklyn Rapid Transit Company's elevated system, is accepted with every evidence of satisfaction by the fare-box people. They now argue that the field is open for the general adoption of their devices to supersede the condemned turnstiles on the company's station platforms.



## Orders Should Be Placed For Coal Supply

Any Modification in Zoning Plan Will Restrict Rather Than Enlarge Source of Supply

In a statement urging the immediate placing of orders for coal supply the U. S. Fuel Administration says:

"The Fuel Administration has been advised that coal consumers in some sections of the country are withholding their orders for coal in the expectation that the zone of distribution may be altered in a way that will broaden their sources of supply. It should be distinctly understood by coal producers, coal dealers and coal consumers that the regulations carrying out the "zoning order" of the distribution of coal consumption were adopted in conjunction with the Railroad Administration, after the most careful study of the whole problem.

"Any modification of the zoning plan that may be made will be in the direction of further restriction rather than toward enlarging sources of supply.

"War demands for coal as the year advances may demand still further restrictions of the consumer's freedom to choose coal.

"There should, therefore, be no further delay upon the part of coal dealers and coal consumers in placing their orders for their coal supply. Patriotism demands that orders be placed at once in order that the railroads may realize the exact transportation movement demanded for coal, and in order that production may be maintained at a maximum."

## Standard Catalog Sizes

Conference Called by Committee of Purchasing Agents' Association  
—Differences of Opinion

Catalogs intended for preservation by purchasing agents are to be limited to one size hereafter, according to plans laid by the National Association of Purchasing Agents. A committee of that association has called a conference to discuss the matter in the La Salle Hotel, Chicago, on May 22.

At the Pittsburgh convention of purchasing agents the size 8½ in. x 11 in. was tentatively adopted with the proviso that it should be adhered to unless good reasons appeared for changing it. The committee has had the matter up with 575 associations, representing various industries and trades, and 287 trade paper publications. There seems to be quite a difference of opinion on this subject.

It has been urged also that the purchasing agents consider either now or in the very near future the matter of standardization of the sizes of other printed matter.

The first object will be to settle definitely upon the size for catalogs. After that has been accomplished if there is

subjects may be discussed to good advantage, because after all the purchasing agent is vitally interested in anything that will reduce the cost of doing business. Standardization is bound to produce favorable results.

The conference is open to everyone. Every association representing industry in any form is invited to send representatives to discuss these various phases with the committee. The desire of the committee is to have all facts before it reaches a decision, so that after it has arrived at a conclusion there will be no cause for objection. Those interested are requested to communicate with the chairman of the committee, W. L. Chandler, care Dodge Sales & Engineering Company, of Mishawaka, Ind.

## Rolling Stock

Nova Scotia Tramways Power Company, Halifax, N. S., is reported as contemplating the purchase of cars, equipment and generating machinery

Monroe (La.) Municipal Street Railway has been authorized by a vote of the Council to purchase four rebuilt cars from the Shreveport (La.) Railways for \$13,000, as referred to in the ELECTRIC RAILWAY JOURNAL of April 6.

Washington Water Power Company and the Spokane Traction Company, Spokane, Wash., are remodeling more of the two-man cars into the one-man cars for use on city lines. The former is having 40 of its cars remodeled and the latter is having five remodeled, all of which are expected to be put into service soon. With the inception of one-man cars on two of its lines the Washington Water Power company is changing from 15 to 10-minute service.

Public Service Railway, Newark, N. J., on account of the U. S. Shipping Board for the Emergency Fleet Corporation will erect two pay-as-you-enter terminals and loops at the South Camden and Gloucester shipyards, which will provide loading space for ten cars and storage accommodations for thirty cars. The cost of the work will be defrayed by the government.

Brooklyn (N. Y.) Rapid Transit Company, which has asked for specifications on fifty new center-entrance trail cars, the opening of the bids being deferred several times, as noted in the ELECTRIC RAILWAY JOURNAL, will, according to official advices, dispose of the entire matter Monday, April 29.

Philadelphia (Pa.) Railways, practically abandoned, has been rehabilitated, as mentioned in the ELECTRIC RAILWAY JOURNAL of April 6, and will build a double-track extension over the Penrose Ferry Road, to the Hog Island shipyards. Additional cars will be furnished by the United States Shipping Board Emergency Fleet Corporation, which also assumes financial responsibility for the entire program. The

## Western Electric Company Staff Changes

Western Electric Company, New York, N. Y., announces the appended changes in its organization staff: W. P. Hoagland, sales manager, Chicago, Ill.; G. T. Marchmont, sales manager, Richmond, Va.; J. H. Symonds, stores manager, Minneapolis, Minn.; George M. Dunn, manager, Philadelphia, Pa.; Jerome D. Kennedy, assistant contract sales manager, Hawthorne, Ill.; Joseph L. Ray, manager, Pittsburgh, Pa.; Howard W. Hall, Southern district manager, Atlanta, Ga.; Jay B. Odell, succeeds Mr. Hall in Richmond, Va.; Clark H. Minor, special to China and Japan; Fred B. Gleason, contract sales manager, New York, N. Y.; Henry L. Grant, sales department, New York office.

rolling stock is not new, but is being obtained from the surplus equipment of another system.

Miami (Fla.) Traction Company is reported as in the market for gasoline or kerosene motor cars.

Dallas (Tex.) Railways will purchase twelve one-man cars at a cost of \$64,710, in accordance with approval granted by the City Commission under the service-at-cost franchise.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., having placed an order with the St. Louis Car Company, as mentioned in the ELECTRIC RAILWAY JOURNAL of April 13, for 25 new cars, furnishes the specifications that follow:

Number of cars ordered .....	25
Name of road .....	Ft. Wayne & Northern Ind. Co.
Date order was placed .....	April 8, 1918
Date of delivery .....	Aug. 15, 1918
Builder of car body .....	St. Louis Car Co.
Type of car .....	Semit-convertible
Seating capacity .....	34
Weight (total) .....	15,000 lb.
Length over bumpers .....	30 ft. 0 in.
Length over vestibule .....	18 ft. 6 in.
Width over all .....	8 ft. 6 in.
Height, rail to trolley base .....	11 ft. 0 in.
Body .....	Semi-steel
Interior trim .....	Birch and cherry
Headlining .....	Agasote
Roof .....	Arch
Air brakes .....	Westinghouse Traction Brake D. H. 10
Axles .....	Open Hearth Steel
Bumpers .....	Channel
Car trimmings .....	Bronze
Conduits and junction boxes .....	Crouse-Hinds
Control, type .....	K 63 B
Couplers .....	Shackle bar pocket
Curtain fixtures .....	Ring 88
Curtain material .....	Pantastone
Designation signs .....	Keystone
Door operating mechanism .....	St. Louis Car Co.
Fare boxes .....	Cleveland
Gears and pinions .....	Gen. Elec. Co.
Hand brakes .....	Peacock, no staff
Heaters .....	Peter Smith Electric
Headlights .....	Golden Glow
Journal boxes .....	St. Louis Car Co.
Lightning arresters .....	G. E.
Motors, type and number .....	G. E., 258, inside hung
Paint, varnish or enamel .....	Railway Co.'s Standard
Sanders .....	O. B. valves, Keystone traps
Sash fixtures .....	O. M. Edwards
Seats, style .....	Hale & Kilburn, cross and longitudinal
Seating material .....	Rattan
Step treads .....	Feralun
Trolley catchers or retrievers .....	O. B. catcher
Trolley base .....	U. S. 15
Trolley wheels or shoes .....	6 in. wheel
Trucks, type .....	St. Louis Car Co. No. 113 B
Ventilators .....	Garland
Wheels (type and size) .....	26-rolled steel
Special devices, etc. .....	Forsyth beadless brass sash

## Trade Notes

Russell A. Griffin, for fourteen years manager of the Western Electric Company's pole department at the New York office, on April 1 became vice-president of the National Pole Company, Spokane, Wash., with headquarters in New York.

Robert S. Blake, formerly connected with the Condit Electric & Manufacturing Company, Boston, Mass., as its Pittsburgh, Pa., representative, is now district manager for the Duquesne Electric & Manufacturing Company, with its Chicago office at 230 South La Salle Street.

Perry Ventilator Company, Boston, Mass., has received the order for ventilators in the fifty new center-entrance trail cars to be ordered by the Brooklyn (N. Y.) Rapid Transit Company, according to an agreement with the Public Service Commission of the First District.

Thomas M. Cluley, who has been associated with the Union Electric Company for the last twenty-two years, has joined the forces of the W. A. McCombs & Co., Pittsburgh. The McCombs company manufactures safety switches and is territorial representative of a number of well known manufacturers.

Laco-Philips Company of 131 Hudson Street, New York City, has placed upon the market a glass product under the trade name of "Laco-daylite," which, it claims, will permit correct determina-

tion of color values. It is made by chemically treating plain glass and comes in standard sizes and shapes for all reflectors on the market. It is designed for places where color values or accurate measurements are especially important.

Herbert A. Jackson has been elected president of the Chicago Pneumatic Tool Company of Chicago, to succeed W. O. Duntley, resigned. Mr. Jackson has for some time been connected with the Bethlehem Steel Corporation and was more recently head of its Boston office. He has had charge of the sales in that territory, and it is considered probable at Chicago that he will readjust the sales methods of the Chicago company.

J. D. Elsom has joined the staff of the Economy Electric Devices Company, Chicago, as engineer. He will be engaged in the engineering work preliminary to and during the installation of energy saving campaigns using the Sangamo watt-hour meter, for which the above company has the exclusive sales. Mr. Elsom has been engaged in similar work for the Railway Improvement Company for the past five years, previous to which time he was with the Chicago Railways Company as engineer of equipment. Other railways with which Mr. Elsom was connected directly following his engineering studies at college were the Metropolitan Street Railway, New York, and the New York Central, electrical department. His headquarters will be at the general office of the Economy Electric Devices Company, Old Colony Building, Chicago.

## New Advertising Literature

Magnesia Association of America, Philadelphia, Pa.: Anniversary advertising portfolio, entitled "85 Per Cent Magnesia," for 1917.

Roth Brothers & Company, Chicago, Ill.: Circular describing the Rothmotor forge blowers. Other electrically operated machines are also illustrated in the circular.

Bailey Meter Company, Boston, Mass.: Bulletin No. 41, entitled "How to Save Coal," illustrates and describes the Bailey boiler meter, with a partial list of concerns having it in use.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.: Catalog 1-A, February, 1918, superseding catalog 1-A dated May, 1916, which illustrates and furnishes a detailed description of the company's lightning arresters.

Guaranty Trust Company, New York, N. Y.: Pamphlet entitled "Banking Service for Foreign Trade," explaining the bank's facilities in this department. Copies may be had on application.

Ohio Brass Company, Mansfield, Ohio: Supplement No. 1, Feb. 1913, containing additions and improvements to the O-B materials listed in general catalog No. 16. The new types and improvements on various railway material and line equipment are described in comparison with former models.

## NEW YORK METAL MARKET PRICES

	April 17	April 24
Copper, ingots, cents per lb.	23½	23½
Copper wire base, cents per lb.	26½ to 26½	26½ to 26½
Lead, cents per lb.	6.95	6.90
Nickel, cents per lb.	50	50
Spelter, cents per lb.	7	6.87½
Tin, Straits, cents per lb.	90	90
Aluminum, 98 to 99 per cent., cents per lb.	*32 10	*32 10

\* Government price in 50-ton lots, f.o.b. plant.

## OLD METAL PRICES—NEW YORK

	April 17	April 24
Heavy copper, cents per lb.	22	22
Light copper, cents per lb.	19½	19½
Red brass, cents per lb.	18	18
Yellow brass, cents per lb.	13	13
Lead, heavy, cents per lb.	6½	6
Zinc, cents per lb.	5½	5½
Steel car axles, Chicago, per net ton.	\$41.52	\$41.52
Old carwheels, Chicago, per gross ton.	\$29.00	\$29.00
Steel rails (scrap), Chicago, per gross ton.	\$34.00	\$34.00
Steel rails (relaying), Chicago, gross ton.	\$60.00	\$60.00
Machine shop turnings, Chicago, net ton.	\$16.25	\$16.25

## ELECTRIC RAILWAY MATERIAL PRICES

	April 17	April 24		April 17	April 24
Rubber-covered wire base, New York, cents per lb.	27 to 30	27 to 30	Galvanized wire, ordinary, Pittsburgh, cents per lb.	3.95	3.95
Weatherproof wire (100 lb. lots), cents per lb., New York.	28½ to 34½	28½ to 34½	Car window glass (single strength), first three brackets, A quality, New York, discount.	80% to 82-3%	80% to 82-3%
Weatherproof wire (100 lb. lots), cents per lb., Chicago.	33.42 to 38.35	33.42 to 38.35	Car window glass (single strength, first three brackets, B quality), New York, discount.	79%	79%
T-rails (A. S. C. E. standard), per gross ton.	\$70.00 to \$80.00	\$70.00 to \$80.00	Car window glass (double strength, all sizes AA quality), New York discount.	80%	80%
T-rails (A. S. C. E. standard), 500-ton lots, per gross ton.		\$65.00	Waste, wool (according to grade), cents per lb.	11½ to 22	11½ to 22
T-rails, high (Shanghai), cents per lb.	4½	4½	Waste, cotton (100 lb. bale), cents per lb.	12½ to 13	12½ to 13
Rails, girder (grooved), cents per lb.	4½	4½	Asphalt, hot (150 tons minimum), per ton delivered.	\$38.00	\$38.00
Wire nails, Pittsburgh, cents per lb.	3½	3½	Asphalt, cold (150 tons minimum, pkgs. weighed in, F. O. B. plant, Maurer, N. J.), per ton.	\$42.00	\$42.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	4½	4½	Asphalt filler, per ton.	\$45.00	\$45.00
Railroad spikes, screw, Pittsburgh base, cents per lb.	8	8	Cement (carload lots), New York, per bbl.	\$2.65	\$2.65
Tie plates (flat type), cents per lb.	*3½	*3½	Cement (carload lots), Chicago, per bbl.	\$2.71	\$2.71
Tie plates (brace type), cents per lb.	*3½	*3½	Cement (carload lots), Seattle, per bbl.	\$3.05	\$3.05
Tie rods, Pittsburgh base, cents per lb.	8	8	Linseed oil (raw, 5 bbl. lots), New York, per gal.	\$1.59	\$1.59
Fish plates, cents per lb.	*3½	*3½	Linseed oil (boiled, 5 bbl. lots), New York, per gal.	\$1.60	\$1.60
Angle plates, cents per lb.	*3½	*3½	White lead (100 lb. keg), New York, cents per lb.	10	10
Angle bars, cents per lb.	*3½	*3½	Turpentine (bbl. lots), New York, cents per gal.	42	43½
Rail bolts and nuts, Pittsburgh base, cents per lb.	4.90	4.90			
Steel bars, Pittsburgh, cents per lb.	5	5			
Sheet iron, black (24 gage), Pittsburgh, cents per lb.	4.90	4.90			
Sheet iron, galvanized (24 gage), Pittsburgh, cents per lb.	5.80	5.80			
Galvanized barbed wire, Pittsburgh, cents per lb.	4.35	4.35			

\* Government price.

No Matter How  
Much Money You  
Are Willing to Pay



*The 17/47 Gear-Ratio*

# Peacock Brake

is the best possible brake you can buy for single-truck or light-weight double-truck cars.

We have other brakes selling for more money, but for these classes of cars nothing better is manufactured.

Your regular staff and handle can be easily fitted to this brake. All you need is the brake, as illustrated.

We are prepared to make shipments practically upon receipt of your order.

**National Brake Company**  
Buffalo, N. Y.

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# 4 Repeat Orders for THERMIT WELDS

## On the Third Avenue Railway System, New York



Third Avenue between 34th and 56th Streets, New York

### Order No. 4

Under a Thermit supervisor the Third Avenue Railway men placed during 1916 about 500 Thermit Welds in rail section LS104-429, located on Third Avenue between 34th and 56th Streets.

Here only two joints have broken or less than  $\frac{1}{2}$  of 1 per cent. during two years of hard service.

Thermit Welds insure a smooth and perfectly continuous track of the highest conductivity and greatest mechanical strength.

The joint wear is minimized and even. No dishing can result.

Their success is proved by the many years of continuous service on the busiest electric railways. Let us send you full details. Write.



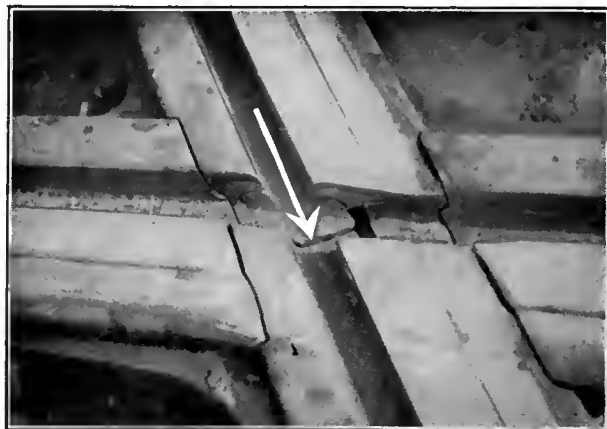
**METAL & THERMIT CORPORATION**  
Successors to Goldschmidt Detinning Co. and the Goldschmidt Thermit Co.  
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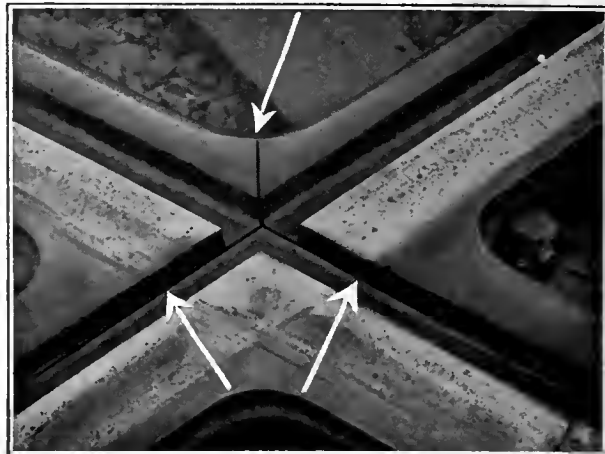
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What Happens to a Rolled Rail Crossing



Joints in Balkwill Articulated Cast Manganese Crossings are life savers. They positively prevent breakage at flangeway intersections, permitting 100% wear before renewal

## Why Balkwill Articulated Cast Manganese Crossings Are Superior to Rolled Rail Crossings

This picture at the left shows where breaks in the main steel filling or backbone of rolled rail crossings are usually found.

These breaks are unavoidable because of the lack of flexibility of the rolled steel filler at the flangeway intersection.

In the Balkwill Articulated Cast Manganese Crossing the difficulty is

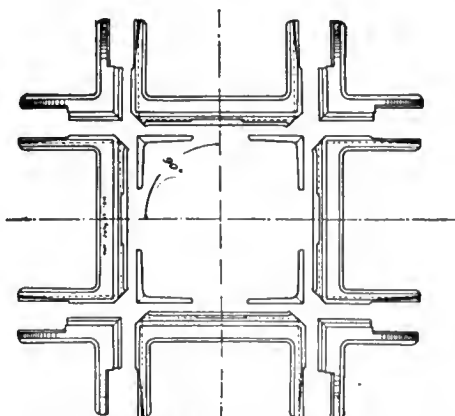
corrected by placing scientifically designed joints at the very places where breakage formerly occurred.

The lower first cost of a rolled rail crossing is therefore not a lower overall cost because it takes several rolled rail crossings to equal the life of one Balkwill Articulated Cast Manganese Crossing. Therefore the Balkwill Crossing is the cheapest in the long run. It gives

**MORE WEAR PER DOLLAR THAN  
ANY OTHER CROSSING YOU CAN BUY**

It saves interruptions to traffic, makes less demand on labor, which is now so scarce, and also reduces the cost of making replacements frequently.

Write us for data on existing installations. If your special work manufacturer cannot get prompt deliveries of manganese castings or has not taken out a license to manufacture these crossings, **DON'T ACCEPT A SUBSTITUTE** but write us direct and we will see that your requirements are taken care of.



Joints at the flangeway intersections of Balkwill Articulated Cast Manganese Crossings positively eliminate breakage

**Order Balkwill Articulated Cast Manganese Crossings  
Direct from Your Special Work Manufacturers**

# The Balkwill Manganese Crossing Co.

506 Williamson Building, Cleveland, Ohio

# For the Emergency Job or the Steady Grind



## RECIPROCATING TRACK GRINDERS

save money for the scores of companies using them. First, by keeping tracks in *constantly* good condition. This reduces wear and tear on both track and rolling stock and consequently reduces repair and replacement costs on both. Definite figures of the damage to rolling stock caused by bad track would be hard to get at but it is unquestionably a big item.

Second, Reciprocating Grinders make it economical, practical and simple to restore to good condition, by grinding, even extremely bad stretches of track.

In the second case the saving is of course immediately obvious and usually means a good amount in a lump sum.

In judging the value of the Reciprocating Grinder, however, the fact that many railway companies have saved by grinding (instead of replacement) sums as high as \$40,000 on a single stretch of track should not obscure the fact that these machines are turning in savings *every day* to companies that use them regularly for efficient track maintenance.

A thousand dollars saved has the same value whether it is in the shape of a thousand dollar bill or 500 two-dollar bills.

### RAILWAY TRACK-WORK COMPANY

30th and Walnut Streets, Philadelphia

AGENTS: Holden & White, Inc., 343 S. Dearborn St., Chicago.  
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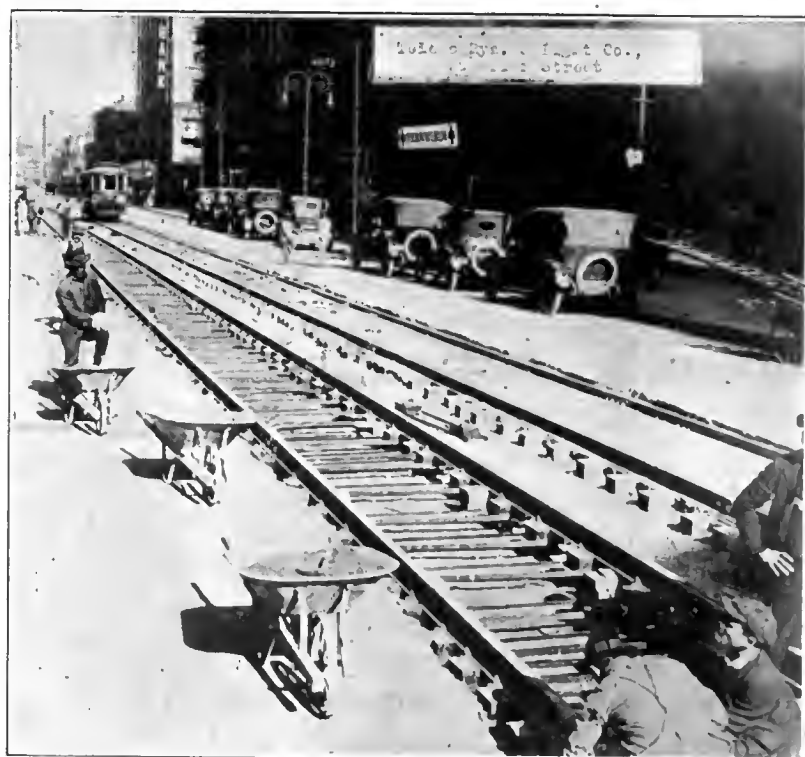


## First Cost *and* Final Cost

Wooden ties, without any of the labor cost of laying, are cheaper, piece for piece, than Dayton Mechanical Ties—we freely admit that!

Untreated wooden ties **completely installed** with gravel ballast cost 6% more than Dayton Mechanical Ties for the same length of track.

Wooden ties, **at the end of ten years**, cost more than twice as much as Dayton Mechanical Ties.



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D.M. Ties are permanent.

D.M. Ties outlast the pavement.

D.M. Ties are cushioned with an asphalt base, under the wooden rail support.

D.M. Ties are attached to the rails as shown in the picture on the left.

D.M. Ties form a rigid, reinforced concrete bed, each tie resting on its own highly resilient cushion.

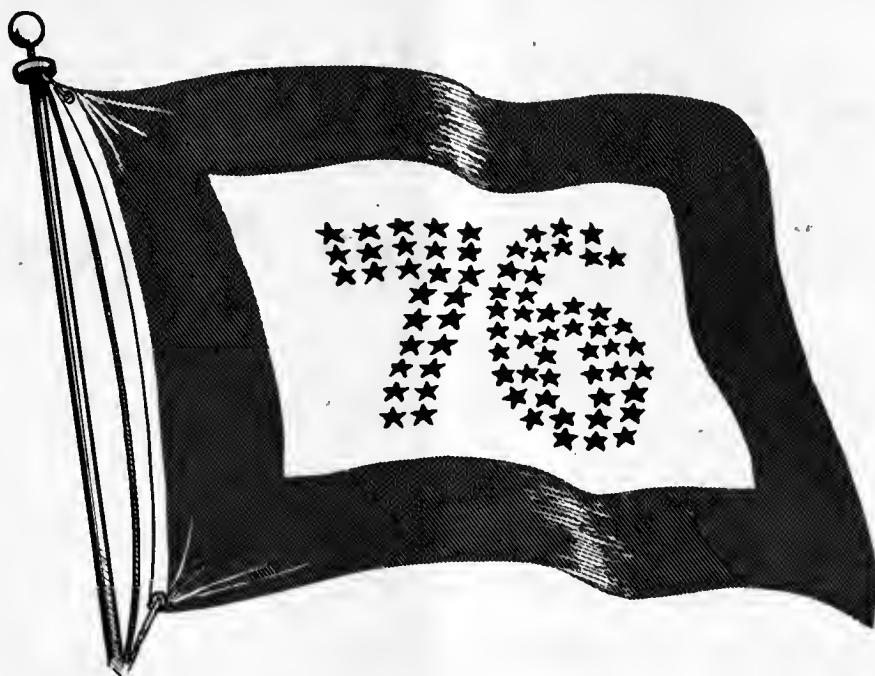
Your inquiry for full particulars regarding Mechanical Railway Ties will be a step in the direction of better economy. Write today.



THE DAYTON MECHANICAL TIE CO.

201 Third Street Arcade  
DAYTON, OHIO





WE have backed up our 76 men at the front by buying \$20,000 in bonds of the Third Liberty Loan.

*Buy Liberty Bonds*



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JOHN G. BUEHLER, President

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# *A Timely and Patriotic Business Proposition*

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## Cut Out the Waste!

NOW is the time to clean up!

Every piece of idle equipment, unnecessary material or scrap represents WASTE!

- waste Money!*
- waste Time!*
- waste Space!*
- waste Labor!*
- waste Material!*

—the *money* such equipment or material cost earns nothing and is not available for other use.

—the *time* it is idle is wasted when it can render service elsewhere.

—the *space* it occupies costs money and may be needed for other purposes.

—the *labor* of its manufacture is wasted and also the labor of producing a duplicate for the man who *can* use it.

—the *material* it represents would be a welcome addition to present short stocks.

Start your Spring clean-up with a resolve to cut out *all* this waste. Don't have material or equipment around that is not needed. Turn it into cash.

There never was a better market for either scrap or good used machinery. There never was a time when conservation of both materials and machinery counted for so much to the whole nation.

---

*Buyers for junk or scrap are readily found in most localities. Buyers for material or good used machinery you don't need can best be reached through the Electric Railway Journal Searchlight Section.*



# NOARK" FUSE



**Ready  
when needed**

THERE never has been so little justification to flirt with safety as today. Taking a chance in normal times, while never justifiable, at least was limited to commercial hazard—but today commercial loss means an economic set-back—an enemy victory right here at home. ¶

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The Underwriters' label on a "Noark" approved Fuse is the countersign that in these war times may mean insurance worth a million dollars. And the name "Noark" on a fuse means that every possible mechanical and structural detail is the best that can be made.

"Noark" approved Fuses conform strictly to the rulings and recommendations of the Underwriters' Laboratories, Inc., after examination under the provisions of the National Electrical Code.

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This book is a complete manual of modern transportation methods and practice. It aims to stop profit leaks due to faulty transportation practice.

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## LINCOLN WELDED BONDS

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The Lincoln Bonding Machine can also be used for every kind of welding repairs in the barn or shop. A sturdily built machine that requires only the minimum upkeep.

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# Carnegie Rolled Steel Gear Blanks

a large ingot is first rolled into a cylindrical bloom of proper diameter from which individual discs of the proper length are then cut. These discs are then forged and rolled into gear blanks.

This method of a maximum amount of rolling and forge work will secure a desired close grain structure which will readily yield to final refinement by the proper methods of heat treatment.

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The use of Chilled Iron Wheels does not involve the cost of an expensive wheel lathe.

The wear on rails due to flange friction is at a minimum.

Twenty to twenty-five per cent. in the loss of metal of brake shoes is saved.

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We can truthfully claim that no suggestion for improvements is ever turned down by our engineers without the most careful and impartial investigation. And the cars which leave our shops bear witness to the truth of this claim.

*Our experience and facilities are at your service for complete cars or trucks.*

**St. Louis Car Company**  
 St. Louis, Mo.

## BRAKE SHOES STANDARDIZE

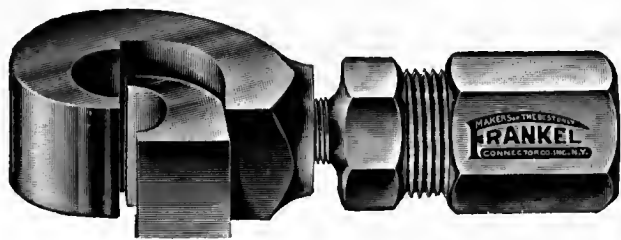
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 Conserve Material, Labor,  
 Time and Money—  
 Ask us.

**American Brake Shoe &  
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Will connect bleeders of cable, rod, or wire, to the main line quickly and effectively, without solder. These taps are made to connect any size bleeder to the feeder. The FRANKEL line of connectors is complete for every purpose.

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Strongest STEEL POLE of like weight in the world.  
Best STEEL POLE in the world for electric railway trolley service, Power Transmission or Street Lighting.  
Most artistic STEEL POLE in the world for any service.  
We make the lowest prices.  
We have constantly on hand about two thousand tons of steel and can make immediate shipments.  
A full line of convenient malleable fittings.  
Our steel pole TREATISE tells a big story. Ask for it.

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Third Rail Insulators, Trolley Bases, Poles, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches.

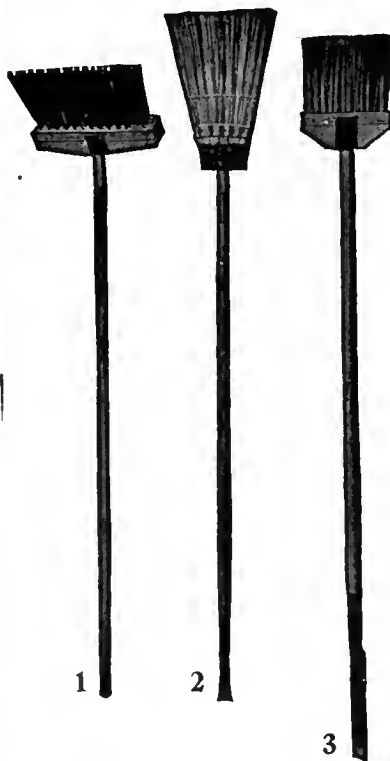
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No. 2 to handle light dirt and snow in the frogs, switches, and curves.

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No. 1 and No. 3 contain Flat Steel Tempered Wire, and nothing superior can be produced. Serviceable all the year round. Your road is not complete without them.

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Beats Solid Copper 40 Ways

Cheaper—Lighter—Stronger—Higher Elastic Limit—Costs Less to Maintain

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Drew Frogs and Crossings—Obviate "trolley off."  
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Automatic Signals  
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Single-track block-signal protection  
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Proceed signals in street reconstruction work.

United States Electric Signal Co.  
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This man  
received an increase of  
30 per cent. in his salary

—because he had the business judgment  
to announce this want in the Searchlight  
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POSITION wanted by young man with  
7 years' experience as armature winder  
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WE MAKE THIS GRADE ONLY

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We'll supply you with

**"ACME" (NESTABLE)  
CORRUGATED CULVERTS**

Made of Galvanized Anti-Corrosive NO-CO-RO METAL  
IN BREAK-JOINTED SECTIONS ready to install in  
any length—joining bands unnecessary.

SET-UP COMPLETE ready for the ditch as illus-  
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NESTED for car-economy and ease of transportation  
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Or we'll supply you with our

**IMPERIAL RIVETED  
CORRUGATED METAL CULVERTS**

We have unequalled facilities for the manufacture  
of either "ACME" (Nestable) culverts of NO-CO-RO  
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Our local rolling mill connections makes our supply  
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Write for our reasonable quotations.

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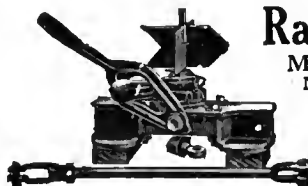
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urges the Committee on Coal Conservation to the Power Plant Operator.

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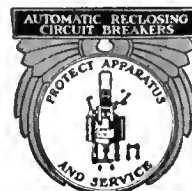
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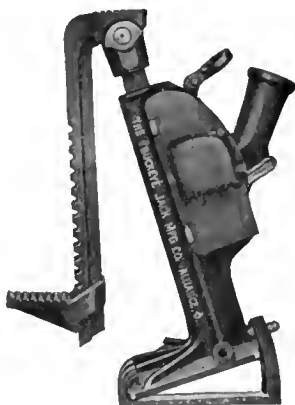
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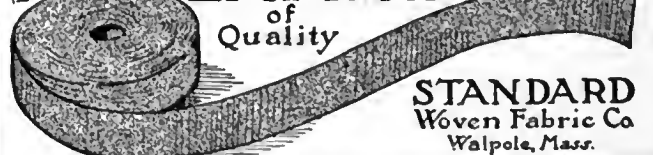
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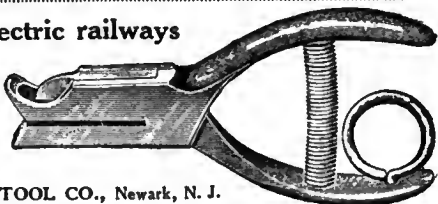
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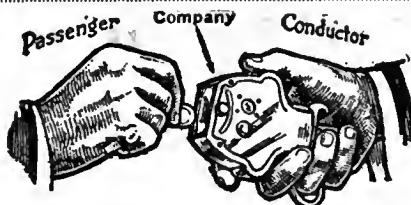
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# SEARCHLIGHT SECTION



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**ELECTRICAL** engineer who has been in charge of power house and high tension work, wanted. Must also have a general knowledge of mechanics, aged 35 to 40, for electrical alloys plant. Address, giving age, references, experience and salary expected. Advancement, Box 31, Station G, Brooklyn, N. Y.

**EXPERIENCED** shop and car house electric railway repairman wanted. Good wages at start with excellent chance for advancement. Large Railway Company located Middle East. P-118, Elec. Ry. Journal, Philadelphia.

**GRADUATE** electrical engineer, having had experience in design, testing and development of the electric equipment of rolling stock wanted. Preferably one familiar with operating difficulties and their solution. Please state all essential details in reply, including salary expected. Excellent opportunity for advancement. P-140, Elec. Ry. Journal, Philadelphia.

**MASTER** mechanic for electric railway company located in city of 100,000 population operating 200 miles of city and inter-urban lines, wanted. In making application, give age, outline of education, experience and salary required. P-143, Elec. Ry. Journal, Chicago.

### In Replying to "Blind" Ads

be careful to put on envelope the key number in the ad. and also local address of office to which reply is sent.

10th Ave. at 36th St., New York.  
1570 Old Colony Bldg., Chicago.  
657 Leader-News Bldg., Cleveland.  
935 Real Estate Trust Bldg., Phila.  
501 Rialto Bldg., San Francisco.

### Important

Original letters of recommendation or other papers of value should not be enclosed to unknown correspondents—send copies.

### POSITIONS VACANT

**SUPERINTENDENT**—A small southern road offers \$100 per month with excellent opportunities for future advancement to a man that has the combined experience and qualifications for a working car-barn foreman and superintendent of transportation. Tell us all about yourself and why you believe you are the man we want. P-141, Elec. Ry. Journal, Chicago.

**GENERAL** auditor wanted for Public Service Company near Pittsburgh, Pa., operating street railway and electric properties. Must be thoroughly experienced in public utility work. Initial salary \$200 to \$250 per month. Apply by mail, stating age, qualifications, with full details regarding experience, present salary and references. P-146, Elec. Ry. Journal, Philadelphia.

### POSITIONS WANTED

**AUDITOR**, thoroughly capable in public utility accounting, solicits change. Sixteen years' experience, age 39, married, references. PW-73, Elec. Ry. Journal, Cleveland.

**APPRAISAL** engineer, age 40, technical education and ten years' experience on interurban and street railway construction, power plants, transmission lines, elevated and subway lines. Five years' experience with State Utilities Commission on appraisal of electric railway and light, rate investigations, traffic surveys. Desires position with Public Service Corporation east of St. Louis. References. Minimum salary \$250 per month. Address PW-130, Elec. Ry. Journal, Cleveland.

**AUDITOR**; 16 years' experience with large interurban and city properties. Employed, solicits change. References from present and past employers. Age 37. Married. PW-108, Elec. Ry. Journal, Chicago.

**AUDITOR**; Solicits change thirteen years' experience Street Railway Accounting. Age 35; married. References. PW-125, Elec. Ry. Journal.

**CONTROLLER** man or wireman wants position. 8 years' experience on all types controllers and car wiring. Best of references. PW-134, Elec. Ry. Journal.

**ENGINEER**—Age 35, married, experienced as station design and construction, maintenance and operation. Formerly with central station, now with railway company. Best of references. PW-135, Elec. Ry. Journal.

**EXECUTIVE** of medium sized city and interurban property. Age 35, married, and now employed. Desires position as Manager or Ass't. Manager. Thoroughly familiar with operation and construction of both city and interurban lines. Especially good in handling Public relations and commission hearings. Correspondence confidential. PW-124, Elec. Ry. Journal, Philadelphia.

### POSITIONS WANTED

**GENERAL** manager, now employed, with 12 years' experience, capable of taking entire charge of road, will consider making change. Desirable man for those who control road but live at distant place. PW-131, Elec. Ry. Journal, Philadelphia.

**GENERAL** superintendent of property operating 80 city and interurban cars desires to change. Experience covers transportation, shop and track departments. References from present and past employers. PW-123, Elec. Ry. Journal, Philadelphia.

**HIGH-GRADE** operating man open for engagement as superintendent. Has high speed interurban, city and steam railroad experience of twenty years. First-class references; married; no preference as to locality. PW-99, Elec. Ry. Journal, Chicago.

**MASTER** mechanic;—by a practical high grade Electric Railway man. Technical education and a practical mechanic. Both city and high speed interurban experience. Married, good habits, best references. PW-129, Elec. Ry. Journal, Philadelphia.

**MASTER** mechanic or general foreman wants position; thoroughly experienced in most efficient and systematic methods of inspection and overhauling of city and interurban cars, trucks, motors, controls, complete equipment, 12 years incharge of shops; age 35; married; now employed; references. PW-102, Elec. Ry. Journal, Chicago.

**POSITION** wanted. Manager, superintendent or auditor. Have 10 years' experience management railway and lighting property. For quick action address PW-107, Elec. Ry. Journal, Chicago.

**SHOP** foreman, experienced on city or interurban electric cars, wants position. 12 years' experience. PW-132, Elec. Ry. Journal, Chicago.

**SUPERINTENDENT** of transportation for city and suburban street railway. Position wanted by a young man with 13 years' of successful experience. Medium size property preferred. PW-144, Elec. Ry. Journal, Cleveland.

**TRAFFIC** man; eight years' experience with large electric railways. Familiar with both freight and passenger business. PW-109, Elec. Ry. Journal, Chicago.

**TRAVELING** auditor; experienced, best of references, employed. Exempt from military service. PW-110, Elec. Ry. Journal, Chicago.

**WANTED**, position as master mechanic or superintendent of equipment. Familiar with K-type M. and H. L. controls, city and high-speed inter-urbans, electric locomotive and MCB work. Have had twenty-five years' experience. Can leave at once. references. PW-114, Elec. Ry. Journal, Chicago.

**WANTED**—Position as working Master Mechanic on medium sized road. Have served in that capacity for 14 years in cities 35,000 and smaller. PW-139, Elec. Ry. Journal, Chicago.

### Equipment Engineer

Ten years' experience in construction and test of street, interurban and main line electric railways. Desires position with sales department of manufacturing company. AS-145, Elec. Ry. Journal.



# WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry  
with Names of Manufacturers and Distributors

## Acetylene Service and Apparatus.

Oxweld Acetylene Co.

## Advertising, Street Car.

Collier, Inc., Barron G.

## Air Cleaners.

Horne Mfg. Co.

## Air Rectifiers.

Holden & White, Inc.

Titanium Alloy Mfg. Co.

## Anchors, Guy.

Electric Service Supplies Co.  
Holden & White, Inc.  
Johns-Manville Co., H. W.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

## Anti-Climbers.

Railway Improvement Co.

## Armature Shafts.

Laclede Steel Co.

## Automobiles and Buses.

Brill Co., The J. G.

## Axle Straighteners.

Columbia M. W. & M. I. Co.

## Axles, Car Wheel.

Bemis Car Truck Co.  
Brill Co., The J. G.  
Carnegie Steel Co.  
Laclede Steel Co.  
National Railway Appliances Co.  
St. Louis Car Co.  
Standard Steel Works Co.  
Westinghouse Elec. & M. Co.

## Babbittting Devices.

Columbia M. W. & M. I. Co.

## Badges and Buttons.

Electric Service Supplies Co.  
International Register Co., The

## Batteries, Dry.

Johns-Manville Co., H. W.  
Nichols-Lintern Co.

## Batteries, Storage.

Electric Storage Battery Co.

## Bearings and Bearing Metals.

Ajax Metal Co.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
General Electric Co.  
More-Jones Brass & Metal Co.  
St. Louis Car Co.  
Westinghouse Elec. & M. Co.

## Bearings, Center and Roller Slide.

Holden & White, Inc.

## Bearings, Roller and Ball.

Gurney Ball-Bearing Co.

## Bells and Gongs.

Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
St. Louis Car Co.

## Benders, Rail.

Niles-Bement-Pond Co.  
Zelnicker Sup. Co., W. A.

## Boilers.

Babcock & Wilcox Co.

## Boiler Cleaning Compounds.

Dearborn Chemical Co.  
Johns-Manville Co., H. W.

## Boiler Coverings.

Johns-Manville Co., H. W.

## Boiler Tubes.

National Tube Co.

## Bond Testers.

American Steel & Wire Co.

## Bonding Apparatus.

American Steel & Wire Co.  
Electric Railway Improvement Co.  
Electric Service Supplies Co.  
Imperial Brass Mfg. Co.  
Ohio Brass Co.  
Oxweld Acetylene Co.

## Bonds, Rail.

American Steel & Wire Co.  
Electric Railway Improvement Co.  
Electric Service Supplies Co.  
General Electric Co.  
Johns-Manville Co., H. W.  
Lincoln Bonding Co.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

## Book Publishers.

McGraw-Hill Book Co., Inc.

## Boring Tools, Car Wheel.

Niles-Bement-Pond Co.

## Braces, Rail.

Kilby Frog & Switch Co.

## Brackets and Cross Arms. (See also Poles, Ties, Posts, Etc.)

Bates Expanded Steel Truss Co.  
Hubbard & Co.  
Lindsay Bros. Co.  
Ohio Brass Co.

## Brake Adjusters.

Holden & White, Inc.  
Westinghouse Traction Brake Co.

## Brake Shoes.

Amer. Brake Shoe & Fdry. Co.  
Barbour-Stockwell Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
St. Louis Car Co.

## Brackets and Cross Arms

Electric Railway Equipment Co.

## Brakes, Brake Systems and Brake Parts.

Bemis Car Truck Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Holden & White, Inc.  
Horne Mfg. Co.  
National Brake Co.  
St. Louis Car Co.  
Westinghouse Trac. B. Co.

## Brooms, Track, Steel or Rattan.

Paxson Co., J. W.  
Zelnicker Supply Co., W. A.

## Brush Holders.

Anderson Mfg. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Eureka Co.

## Brushes, Carbon.

General Electric Co.  
Jeandron, W. J.  
Morgan Crucible Co.  
United States Graphite Co.  
Westinghouse Elec. & M. Co.

## Brushes, Graphite.

Dixon Crucible Co., Jos.  
United States Graphite Co.

## Bushings, Case Hardened and Manganoese.

Bemis Car Truck Co.

## Cables. (See Wires and Cables.)

## Carbon Brushes. (See Brushes, Carbon.)

## Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—See those headings.)

## Car Trimmings. (For Curtains, Registers, Doors, Seats, etc.—See those headings.)

## Cars, Passenger, Freight, Express, etc.

American Car Co.  
Brill Co., The J. G.  
Kuhlman Car Co., G. C.  
McGuire-Cummings Mfg. Co.  
St. Louis Car Co.  
Wason Mfg. Co.

## Cars, Second Hand.

Electric Equipment Co.

## Cars, Self-Propelled.

Electric Storage Battery Co.  
General Electric Co.

## Castings, Brass, Composition or Copper.

Anderson Mfg. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
Horne Mfg. Co.  
Mors-Jones Brass & Metal Co.

## Castings, Gray Iron and Steel.

American Steel Foundries  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Horne Mfg. Co.  
St. Louis Car Co.  
Standard Steel Works Co.  
Union Spring & Mfg. Co.

## Castings, Malleable and Brass.

Amer. Brake Shoe & Fdry. Co.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Horne Mfg. Co.  
St. Louis Car Co.

## Catchers and Retrivers, Trolley.

Electric Service Supplies Co.  
Holden & White, Inc.  
Horne Mfg. Co.  
Ohio Brass Co.  
Wood Co., Chas. N.

## Cellulose, Car.—(See Head Lining.)

## Circuit Breakers.

Automatic Reclosing Circuit Breaker Co.  
General Electric Co.  
Westinghouse Elec. & Mfg. Co.

## Clamps and Connectors for Wires and Cables.

Anderson Mfg. Co., A. & J. M.  
Electric Service Supplies Co.  
General Electric Co.  
Hubbard & Co.  
Ohio Brass Co.  
Westinghouse Elec. & Mfg. Co.

## Cleaners and Scrapers Track.—(See also Snow-Plows, Sweepers and Brooms.)

Brill Co., The J. G.  
Ohio Brass Co.

## Clusters and Sockets.

General Electric Co.

## Coal and Ash Handling.—(See Conveying and Hoisting Machinery.)

## Counting Recorders.

Railway Improvement Co.

## Coil Banding and Winding Machines.

Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.

## Coils, Armature and Field.

Cleveland Armature Works.  
Columbia M. W. & M. I. Co.  
D & W Fuse Co.  
General Electric Co.  
Independent Lamp & Wire Co.  
Westinghouse Elec. & M. Co.

## Coils, Choke and Kleking.

Electric Service Supplies Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.

## Coin-Counting Machines.

International Register Co., The  
Johnson Fare Box Co.

## Commutator Slotters.

Electric Service Supplies Co.  
General Electric Co.  
Westinghouse Elec. & Mfg. Co.  
Wood Co., Chas. N.

## Commutator Truing Devices.

General Electric Co.

## Commutators or Parts.

Cleveland Armature Works.  
Columbia M. W. & M. I. Co.  
Eureka Co.  
General Electric Co.  
Westinghouse Elec. & Mfg. Co.

## Compressors, Air.

General Electric Co.  
Westinghouse Trac. B. Co.

## Condensers

General Electric Co.  
Westinghouse Elec. & M. Co.

## Conduits, Underground.

Johns-Manville Co., H. W.

## Controller Regulators.

Electric Service Supplies Co.

## Controllers or Parts.

Columbia M. W. & M. I. Co.  
General Electric Co.  
Horne Mfg. Co.  
Johns-Manville Co., H. W.  
Westinghouse Elec. & Mfg. Co.

## Controlling Systems.

General Electric Co.  
Westinghouse Elec. & Mfg. Co.

## Converters, Rotary.

General Electric Co.  
Westinghouse Elec. & Mfg. Co.

## Conveying and Hoisting Machinery.

Columbia M. W. & M. I. Co.  
Green Engrg. Co.

## Cord, Bell, Trolley, Register, etc.

Brill Co., The J. G.  
Electric Service Supplies Co.  
International Register Co., The  
Roebbling's Sons Co., John A.  
Samson Cordage Works

## Cord Connectors and Conplers.

Electric Service Supplies Co.  
Samson Cordage Works  
Wood Co., Chas. N.

## Couplers, Car.

Brill Co., The J. G.  
Ohio Brass Co.  
Van Dorn Coupler Co.  
Westinghouse Trac. B. Co.

## Couplings, Conduit.

Horne Mfg. Co.

## Cranes. (See also Hoists.)

Niles-Bement-Pond Co.

## Cresosoting. (See Wood Preservatives.)

## Cross Arms. (See Brackets.)

## Crossing Foundations.

Balkwill Manganese Crossing Co.  
International Steel Tie Co.

## Crossing Signals. (See Signals, Crossing.)

## Crossings, Track. (See Track, Special Work.)

## Culverts.

American Rolling Mill Co.  
Bark River B. & Culvert Co.  
California Cor. Culvert Co.  
Canada Ingot Iron Co., Ltd.  
Canton Culvert & Silo Co.  
Coast Culvert & Flume Co.  
Corrugated Culvert Co.  
Delaware Metal Culvert Co.  
Dixie Culvert & Metal Co.  
Hardesty Mfg. Co., R.  
Illinois Corrugated Metal Co.  
Independence Cor. Cul. Co.  
Iowa Pure Iron Culvert Co.  
Kentucky Culvert Mfg. Co.  
Lons Star Culvert Co.  
Lyle Corrugated Culvert Co.  
Michigan Bridge & Pipe Co.  
Montana Culvert Co.  
Nebraska Culvert & Mfg. Co.  
Nevada Metal Mfg. Co.  
New England Metal Cul. Co.  
North East Metal Co.  
Northwestern Sheet & L. Wks.  
O'Neill Co., W. Q.  
Ohio Corrugated Culvert Co.  
Pennsylvania Metal Cul. Co.  
Road Supply & Metal Co.  
Sioux Falls Metal Cul. Co.



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Western Metal Mfg. Co.  
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Cleveland Frog & Crossing Co.

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Electric Service Supplies Co.

#### Detective Service.

Wisch Service, P. Edward

#### Door Operating Devices.

Consolidated Car Heating Co.  
National Pneumatic Co.

#### Doors, Asbestos.

Johns-Manville Co., H. W.

#### Doors and Door Fixtures.

Brill Co., The J. G.  
General Electric Co.  
Hale & Kilburn Co.

#### Doors, Folding Vestibule.

National Pneumatic Co.

#### Draft Rigging. (See Couplers.)

#### Drills, Track.

American Steel & Wire Co.  
Electric Service Supplies Co.  
Niles-Bement-Pond Co.  
Ohio Brass Co.

#### Dryers, Sand.

Electric Service Supplies Co.  
Zelnicker Sup. Co., W. A.

#### Engineers, Consulting, Contracting and Operating.

Archbold-Brady Co.  
Arnold Co., The.  
Beeler, John A.  
Bylesby & Co., Inc., H. M.  
Ford, Bacon & Davis.  
Jackson, D. C. & Wm. B.  
Pugh, S. D.  
Richey, Albert S.  
Rumery Co., R. R.  
Sauderson & Porter.  
Scofield Engineering Co.  
Sloan, Huddle, Feustel & Freeman  
Stone & Webster.  
White Companies, The J. G.  
Woodmansee & Davidson Engineering Co.

#### Engines, Gas and Oil.

Westinghouse Elec. & Mfg. Co.

#### Engines, Steam.

Westinghouse Elec. & Mfg. Co.

#### Fare Boxes.

Brill Co., The J. G.  
International Register Co., The.  
Johnson Fare Box Co.  
National Railway Appliance Co.

#### Fences, Woven Wire and Fence Posts.

American Steel & Wire Co.  
Page Steel & Wire Co.  
Standard Steel Mould Co.

#### Fenders and Wheel Guards.

Brill Co., The J. G.  
Consolidated Car Fender Co.  
Electric Service Supplies Co.  
Star Brass Works.

#### Fibre and Fibre Tubing.

Johns-Manville Co., H. W.  
Westinghouse Elec. & Mfg. Co.

#### Field Cols (See Cols.)

## WHAT AND WHERE TO BUY

#### Filters, Water.

Scalfe & Sons Co., Wm. B.

#### Fire Extinguishing Apparatus.

Johns-Manville Co., H. W.

#### Fire-Proofing Material.

Johns-Manville Co., H. W.

#### Floodlights.

Electric Service Supplies Co.

#### Flooring Composition.

American Mason Safety Tread Co.  
Johns-Manville Co., H. W.

#### Forgings.

Eureka Co.  
Laclede Steel Co.  
Standard Steel Works Co.

#### Frogs, Track. (See Track Work.)

#### Furnaces. (See Stokers.)

#### Fuses and Fuse Boxes.

Columbia M. W. & M. I. Co.  
D & W Fuse Co.  
General Electric Co.  
Johns-Manville Co., H. W.  
Westinghouse Elec. & Mfg. Co.

#### Fuses, Refillable.

Columbia M. W. & M. I. Co.  
General Electric Co.  
Horne Mfg. Co.

#### Gaskets.

Johns-Manville Co., H. W.  
Power Specialty Co.  
Westinghouse Traction Brake Co.

#### Gas Producers.

Westinghouse Elec. & Mfg. Co.

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Brill Co., The J. G.

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Ohio Brass Co.

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Carnegie Steel Co.  
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National Railway Appliance Co.  
Nuttall Co., R. D.

#### Generating Sets, Gas-Electric.

General Electric Co.

#### Generators.

General Electric Co.  
Westinghouse Elec. & Mfg. Co.

#### Gongs. (See Bells and Gongs.)

#### Graphite.

Dixon Crucible Co., Joseph.  
Morgan Crucible Co.

#### Greases. (See Lubricants.)

#### Grinders and Grinding Supplies.

Indianapolis Switch & Frog Co.  
Metal & Thermit Corp.  
Railway Track-work Co.

#### Grinding Blocks and Wheels

Railway Track-work Co.

#### Guards, Trolley.

Electric Service Supplies Co.  
Ohio Brass Co.

#### Harps, Trolley.

Anderson M. Co., A. & J. M.  
Electric Service Supplies Co.  
Hensley Trolley & Mfg. Co.  
More-Jones B. & M. Co.  
Nuttall Co., R. D.  
Star Brass Works.

#### Headlights.

Electric Service Supplies Co.  
General Electric Co.  
Ohio Brass Co.  
St. Louis Car Co.

#### Heaters, Car (Electric.)

Consolidated Car Heating Co.  
Gold Car Heating & Lighting Co.  
Smith Heater Co., Peter.

#### Heaters, Car, Hot Air and Water.

Cooper Heater Co.  
Smith Heater Co., Peter.

#### Heaters, Car (Stove.)

Electric Service Supplies Co.  
Smith Heater Co., Peter.

#### Hoists and Lifts.

Columbia M. W. & M. I. Co.  
Duff Mfg. Co.  
Ford Chain Block & Mfg. Co.  
Niles-Bement-Pond Co.

#### Hose, Bridges.

Ohio Brass Co.

#### Hose, Pneumatic and Fire.

Johns-Manville Co., H. W.  
Westinghouse Traction Brake Co.

#### Hydraulic Machinery.

Niles-Bement-Pond Co.

#### Hydrogrounds.

Horne Mfg. Co.

#### Inspection.

Electrical Testing Lab's.

#### Instruments, Measuring, Testing and Recording.

Economy Electric Devices Co.  
General Electric Co.  
Johns-Manville Co., H. W.  
Westinghouse Elec. & M. Co.  
Weston Elec'l Instrument Co.

#### Insulating Cloth, Paper and Tape.

General Electric Co.  
Horne Mfg. Co.  
Johns-Manville Co., H. W.  
Mitchell-Rand Mfg. Co.  
Standard Woven Fabric Co.  
Westinghouse Elec. & M. Co.

#### Insulation. (See also Paints.)

Anderson M. Co., A. & J. M.  
Drew Electric & Mfg. Co.  
Electric Service Supplies Co.  
General Electric Co.  
Holden & White, Inc.  
Horne Mfg. Co.  
Johns-Manville Co., H. W.  
Mitchell-Rand Mfg. Co.  
Westinghouse Elec. & M. Co.

#### Insulators. (See also Line Material.)

Anderson M. Co., A. & J. M.  
Electric Service Supplies Co.  
General Electric Co.  
Horne Mfg. Co.  
Johns-Manville Co., H. W.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

#### Insulator Pins.

Electric Service Supplies Co.  
Hubbard & Co.

#### Insurance, Fire.

Marsch & McLennan.

Jacks. (See also Cranes, Hoists and Lifts.)

Brill Co., The J. G.  
Buckeye Jack Mfg. Co.  
Columbia M. W. & M. I. Co.  
Duff Manufacturing Co.  
National Ry. Appliance Co.  
Templeton, Kenly Co., Ltd.

#### Joints, Rail.

Carnegie Steel Co.  
Rail Joint Co.  
Zelnicker Sup. Co., W. A.

#### Journal Boxes.

Bemis Car Truck Co.  
Brill Co., The J. G.

#### Junction Boxes.

Johns-Manville Co., H. W.

#### Laboratory.

Electrical Testing Lab's.

#### Lamp Guards and Fixtures.

Anderson M. Co., A. & J. M.  
Electric Service Supplies Co.  
General Electric Co.  
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#### Lamps, Arc and Incandescent. (See also Headlights.)

Anderson M. Co., A. & J. M.  
General Electric Co.  
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#### Lamps, Signal and Marker.

Nichols-Lintern Co.  
Ohio Brass Co.

#### Lathes, Car Wheel.

Niles-Bement-Pond Co.

#### Lighting Regulators, Car.

Holden & White, Inc.

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Horne Mfg. Co.

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Electric Service Supplies Co.  
General Electric Co.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

#### Line Material. (See also Brackets, Insulators, Wires, etc.)

Anderson M. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
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Electric Service Supplies Co.  
Eureka Co.  
General Electric Co.  
Holden & White, Inc.  
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Johns-Manville Co., H. W.  
More-Jones B. & M. Co.  
Ohio Brass Co.  
Westinghouse Elec. & M. Co.

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Brill Co., The J. G.  
General Electric Co.  
Westinghouse Elec. & M. Co.

#### Lubricating Engineers.

Galena-Signal Oil Co.

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Dearborn Chemical Co.  
Dixon Crucible Co., Jos.  
Galena-Signal Oil Co.

#### Lumber. (See Poles, Ties, etc.)

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Columbia M. W. & M. I. Co.  
Niles-Bement-Pond Co.

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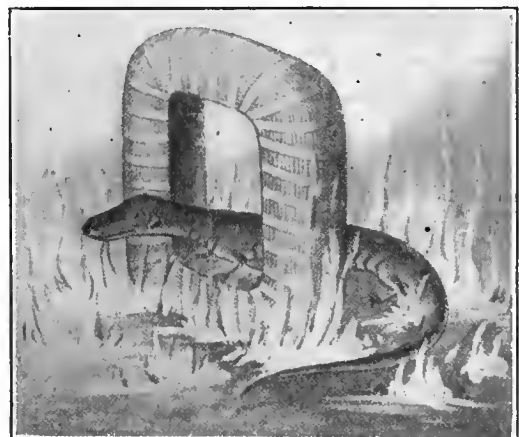
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Wood Co., Chas. N.

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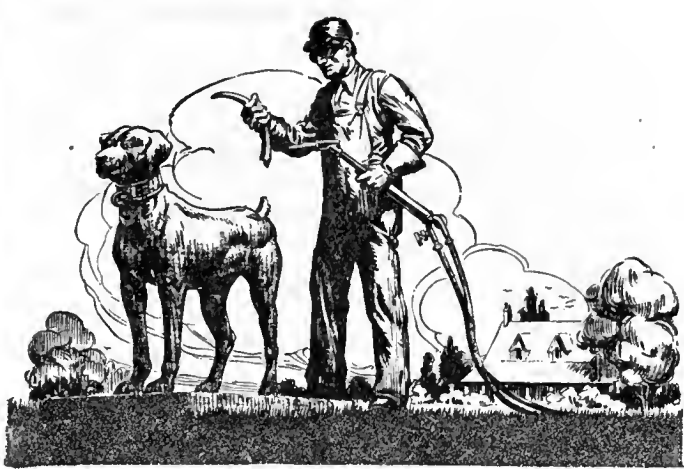
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Wood Preservatives.  
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# Success in Creosoting Poles Depends Chiefly upon Following Instructions

Strict adherence to specifications, provided for the preservative treatment of poles, *positively* assures satisfactory results.

## Carelessness Causes Failures

Rigid inspection is the best guarantee of success. It should be exercised to insure efficiency in the creosoting of poles, and should be based on the following most important requirements of specifications for the *two standard treatments*—the Brush Method and the Open-Tank System:

### Condition of Poles

Poles shall be seasoned until air-dry and otherwise conform to standard specifications.

### Preparation of Poles

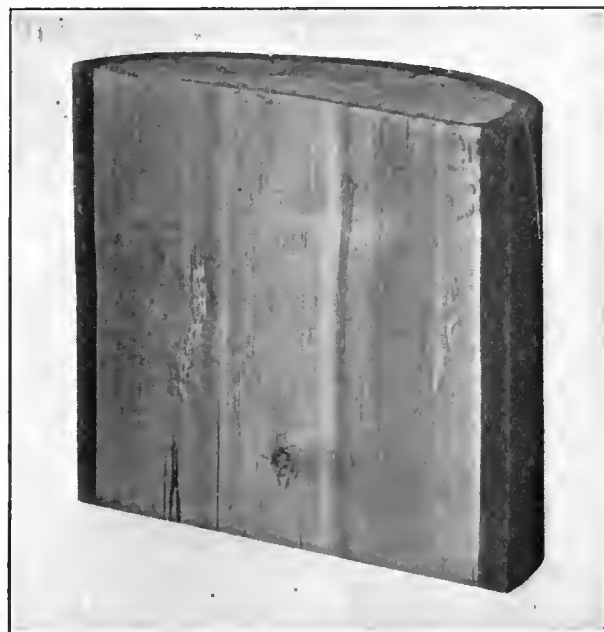
All surfaces which are to be treated shall be carefully cleaned of all adhering inner bark and parts of the exterior surface showing decayed, soft, or brashy wood shall be shaved until sound wood is exposed.

### Tops, Gains, Etc.

Tops, gains, and abrasions shall be given a two-coat Brush application of creosote oil heated to about 150 deg. F.

### Brush Treatment

Carbosota Grade-One Liquid Creosote Oil shall be heated to about 150 deg. F. and two coats applied to that section of the pole extending from one or two feet above, to two or three feet below, the future ground-line. The second coat shall not be applied until the preceding application is thoroughly dry. The preservative shall be used liberally and especial care taken that all checks and crevices are well saturated.



Cross-section of pole-butt properly treated by Open-Tank System (Courtesy E. T. Chapin & Co.)

### Open-Tank System Period of Immersion

Pole-butts shall be continuously submerged in the "hot" and in the "cold" bath, *until the creosote oil has penetrated 75% of the depth of the sap-ring*. A minimum penetration of 50% of the sap-ring

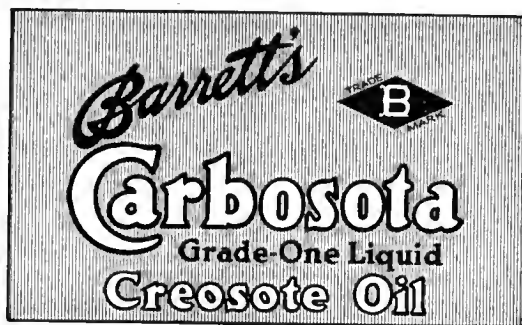
shall be required.

Carbosota Creosote Oil is *standard* for treatment of poles and cross-arms.

It is liquid, permanent, toxic, and economical.

### Technical Service

Complete specifications and other information regarding the preservative treatment of poles may be obtained gratis by addressing nearest office.



### The Barrett Company

New York	Chicago	Philadelphia
Boston	St. Louis	Cleveland
Cincinnati	Pittsburgh	Detroit
Birmingham	Kansas City	Minneapolis
Salt Lake City	Nashville	Seattle Peoria

THE BARRETT COMPANY, Limited  
Montreal Toronto Winnipeg Vancouver  
St. John, N. B. Halifax, N. S. Sydney, N. S.



Brush-treating a 6" 30' cedar pole. Note the use of a mop, which is more satisfactory than a brush.



Modern Open-Tank Process commercial pole-treating plant.



**HELP OUR TOWN  
WIN THE RIGHT  
TO FLY THIS FLAG**

**HONOR FLAG  
3<sup>rd</sup>  
LIBERTY LOAN**

**AWARDED BY THE UNITED STATES TREASURY  
DEPARTMENT TO TOWNS EXCEEDING THEIR QUOTA**

## Street Cars Telling the Message of the Liberty Loan Flag

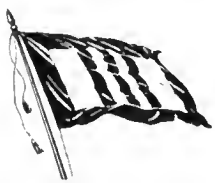
ABOVE is reproduced in one color the street car card featuring the Official Flag of the Third Liberty Loan. This Honor Flag is awarded by the United States Treasury Department to towns exceeding their quota.

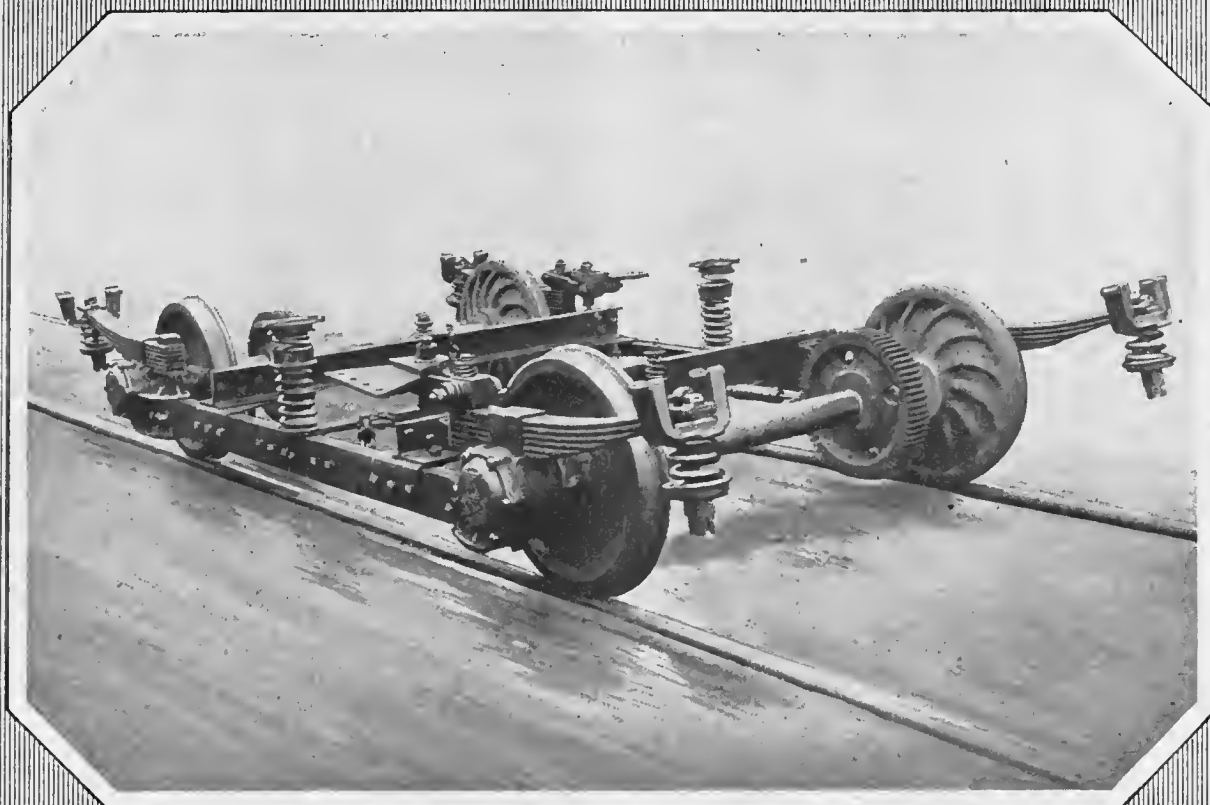
The contributing car advertising companies were pleased to have their medium selected to herald this scheme to the people of the United States, several days in advance of the Loan. On the opening day of the Loan this flag card was replaced by a series of other cards making a stirring patriotic appeal.

**Barron & Collier**  
**INCORPORATED**

Candler Bldg.

220 W. 42nd Street, New York City





## The 78-M Truck for Light-Weight Cars

If you are interested in light-weight single-truck cars there are three things about the 78-M Truck you ought to know: First, with 8-ft. wheelbase and 24-in. wheels, standard for the Birney Safety Car, it weighs only 3300 lb.; secondly, having only spiral springs next to the car body and suspending spiral springs from the ends of the quarter-elliptics makes it the easiest riding single-truck ever built; and thirdly, the long spring base and the fact that practically the whole load is borne on the end springs prevents teetering of the overhanging body and gives a steadiness that hitherto has been obtainable only with double-trucks. Write for Bulletin 234, just published.

THE J. G. BRILL COMPANY  
PHILADELPHIA, PA.

G. C. KUHLMAN CAR COMPANY  
CLEVELAND, OHIO



AMERICAN CAR COMPANY  
ST. LOUIS, MO.

WASON MANUFACTURING CO.  
SPRINGFIELD, MASS.



# ROCHESTER and the GE-258

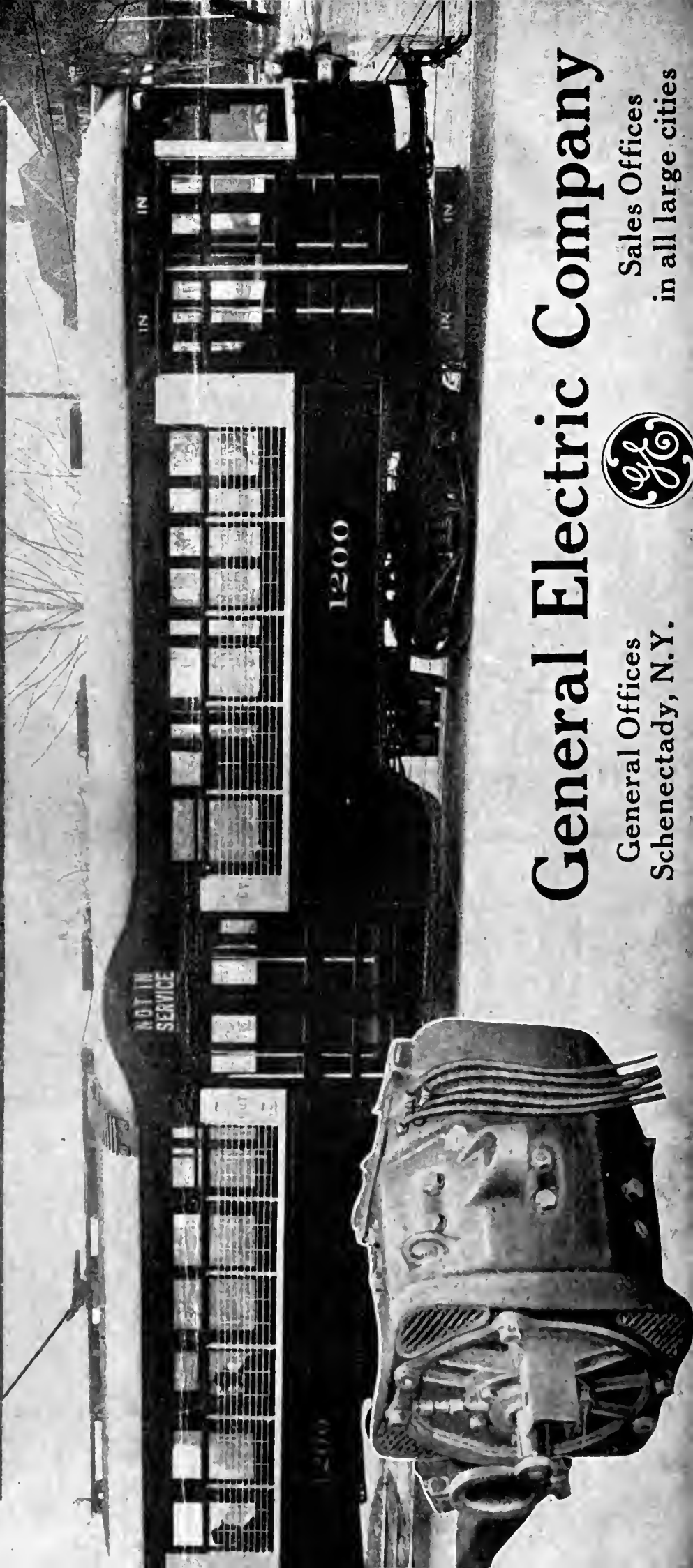
The GE-258 is not only the leading motor for the Light-Weight Safety Car but is also a big factor in the equipment of the latest type large capacity car because it is so well adapted to the low-floor, low-truck design which facilitates quick passenger movement.

## Seventy-five Cars

on the New York State Railways—Rochester Lines—are among the many of low-floor design that have already been equipped with four GE-258 ball-bearing, self-ventilated motors.

The successful operation of the first fifty equipments in Rochester was followed by a second order for 25 additional equipments, making a total of 300 GE-258 motors now in operation in Rochester.

7470



# General Electric Company

General Offices  
Schenectady, N.Y.



Sales Offices  
in all large cities













